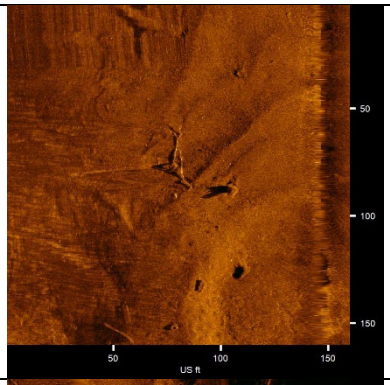
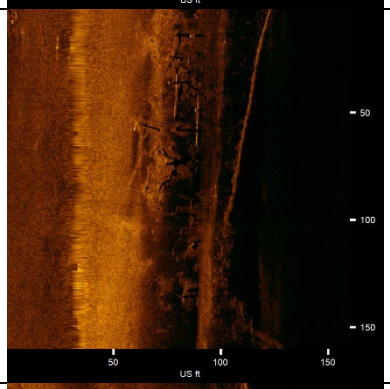
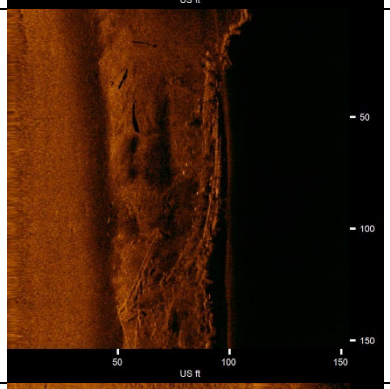
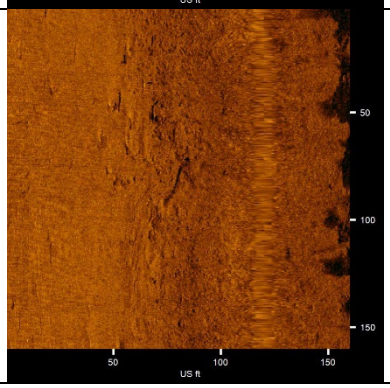
	**S.0020** ● Sonar Time at Target: 1/11/2010 9:58:25 AM ● Click Position 34.2261562243 -77.9535514089 (WGS84) (X) 2316338.66 (Y) 174968.92 (Projected Coordinates) ● Map Projection: NC83F ● Acoustic Source File: C:¥Users¥justi¥OneDrive¥Desktop¥UW_011 7¥Raw¥SS Raw¥SOUTH¥S_15.jsf	**Dimensions and attributes** ● Target Width: 39.25 US ft ● Target Height: 2.24 US ft ● Target Length: 99.61 US ft ● Target Shadow: 10.99 US ft ● Mag Anomaly: ● Avoidance Area: ● Classification1: debris ● Description: Debris scatter
	**S.0021** ● Sonar Time at Target: 1/11/2010 11:35:06 AM ● Click Position 34.2259616868 -77.9511500764 (WGS84) (X) 2317065.29 (Y) 174905.78 (Projected Coordinates) ● Map Projection: NC83F ● Acoustic Source File: C:¥Users¥justi¥OneDrive¥Desktop¥UW_011 7¥Raw¥SS Raw¥SOUTH¥S_2.jsf	**Dimensions and attributes** ● Target Width: 31.41 US ft ● Target Height: 4.16 US ft ● Target Length: 129.57 US ft ● Target Shadow: 10.05 US ft ● Mag Anomaly: ● Avoidance Area: ● Classification1: infrastructure ● Description: Dock
	**S.0022** ● Sonar Time at Target: 1/11/2010 11:34:13 AM ● Click Position 34.2251057455 -77.9512395799 (WGS84) (X) 2317041.53 (Y) 174594.00 (Projected Coordinates) ● Map Projection: NC83F ● Acoustic Source File: C:¥Users¥justi¥OneDrive¥Desktop¥UW_011 7¥Raw¥SS Raw¥SOUTH¥S_2.jsf	**Dimensions and attributes** ● Target Width: 38.75 US ft ● Target Height: 1.53 US ft ● Target Length: 129.18 US ft ● Target Shadow: 5.65 US ft ● Mag Anomaly: ● Avoidance Area: ● Classification1: infrastructure ● Description: dock and debris
	**S.0023** ● Sonar Time at Target: 1/11/2010 11:09:53 AM ● Click Position 34.2255653861 -77.9519678078 (WGS84) (X) 2316819.63 (Y) 174758.95 (Projected Coordinates) ● Map Projection: NC83F ● Acoustic Source File: C:¥Users¥justi¥OneDrive¥Desktop¥UW_011 7¥Raw¥SS Raw¥SOUTH¥S_5.jsf	**Dimensions and attributes** ● Target Width: 8.59 US ft ● Target Height: 0.70 US ft ● Target Length: 20.28 US ft ● Target Shadow: 0.94 US ft ● Mag Anomaly: M.020 ● Avoidance Area: ● Classification1: debris ● Description: Debris

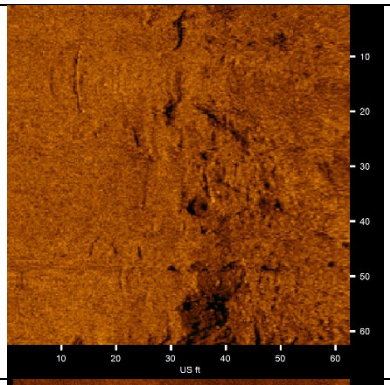
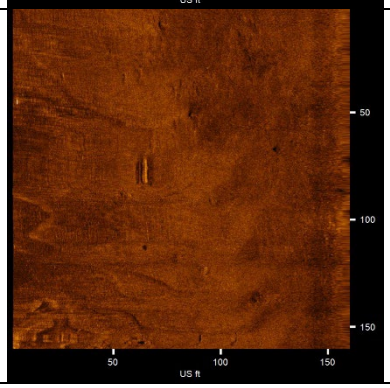
	**S.0024** ● Sonar Time at Target: 1/11/2010 11:10:31 AM ● Click Position 34.2260209054 -77.9518797308 (WGS84) (X) 2316844.50 (Y) 174925.01 (Projected Coordinates) ● Map Projection: NC83F ● Acoustic Source File: C:¥Users¥justi¥OneDrive¥Desktop¥UW_0117¥Raw¥SS Raw¥SOUTH¥S_5.jsf	**Dimensions and attributes** ● Target Width: 10.78 US ft ● Target Height: 1.04 US ft ● Target Length: 43.74 US ft ● Target Shadow: 1.39 US ft ● Mag Anomaly: M.019 ● Avoidance Area: ● Classification1: debris ● Description: Debris scatter
	**S.0025** ● Sonar Time at Target: 1/11/2010 10:28:50 AM ● Click Position 34.2261314843 -77.9530594058 (WGS84) (X) 2316487.48 (Y) 174961.48 (Projected Coordinates) ● Map Projection: NC83F ● Acoustic Source File: C:¥Users¥justi¥OneDrive¥Desktop¥UW_0117¥Raw¥SS Raw¥SOUTH¥S_11.jsf	**Dimensions and attributes** ● Target Width: 3.16 US ft ● Target Height: 0.19 US ft ● Target Length: 13.35 US ft ● Target Shadow: 0.63 US ft ● Mag Anomaly: M.024 ● Avoidance Area: ● Classification1: debris ● Description: Debris

Figure 99: Magnetic Contours in the Southern Marine Survey Area.

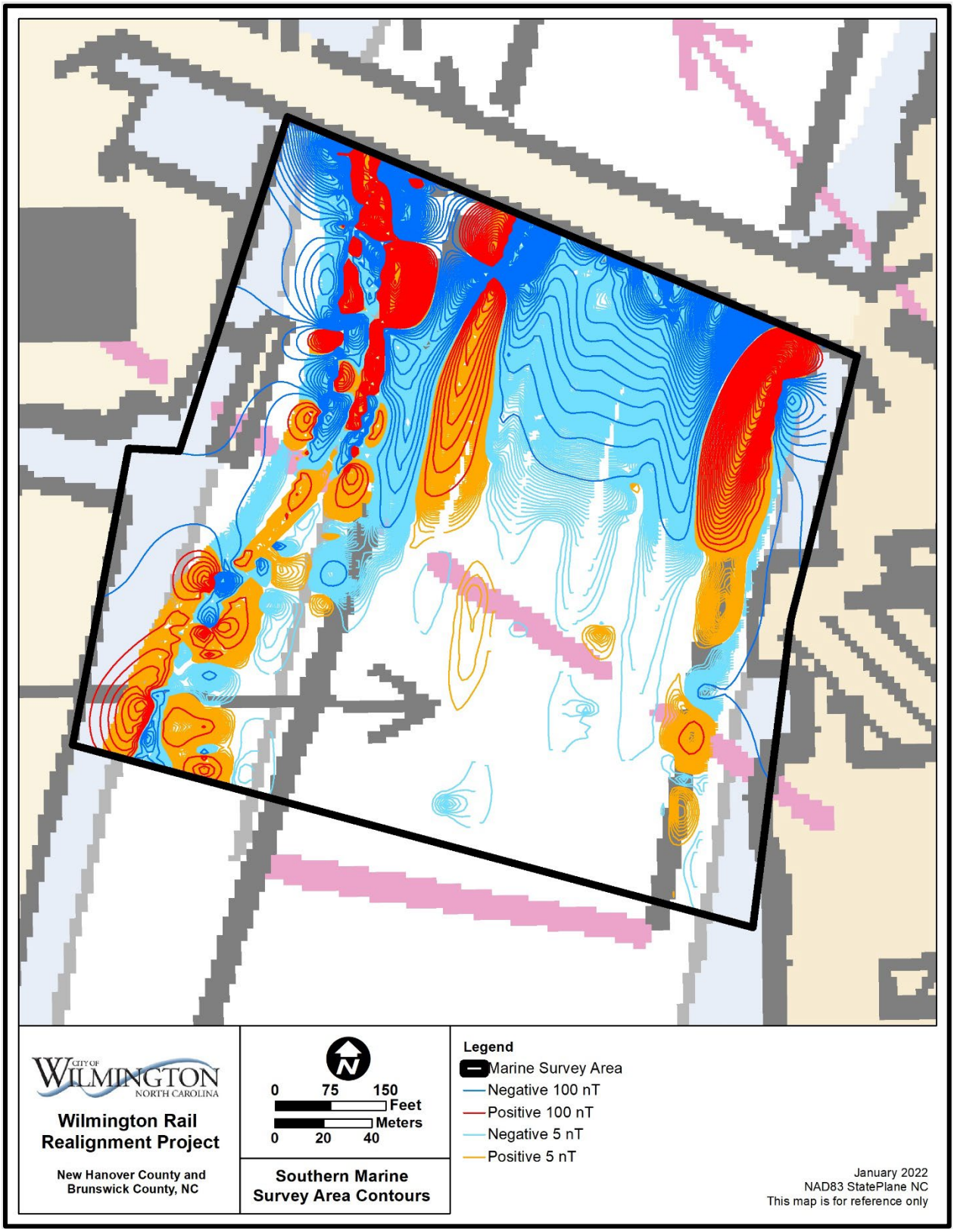


Figure 100: Magnetic Anomalies Identified in the Southern Marine Survey Area.

Figure 101: Side-Scan Sonar Contacts in the Southern Marine Survey Area.

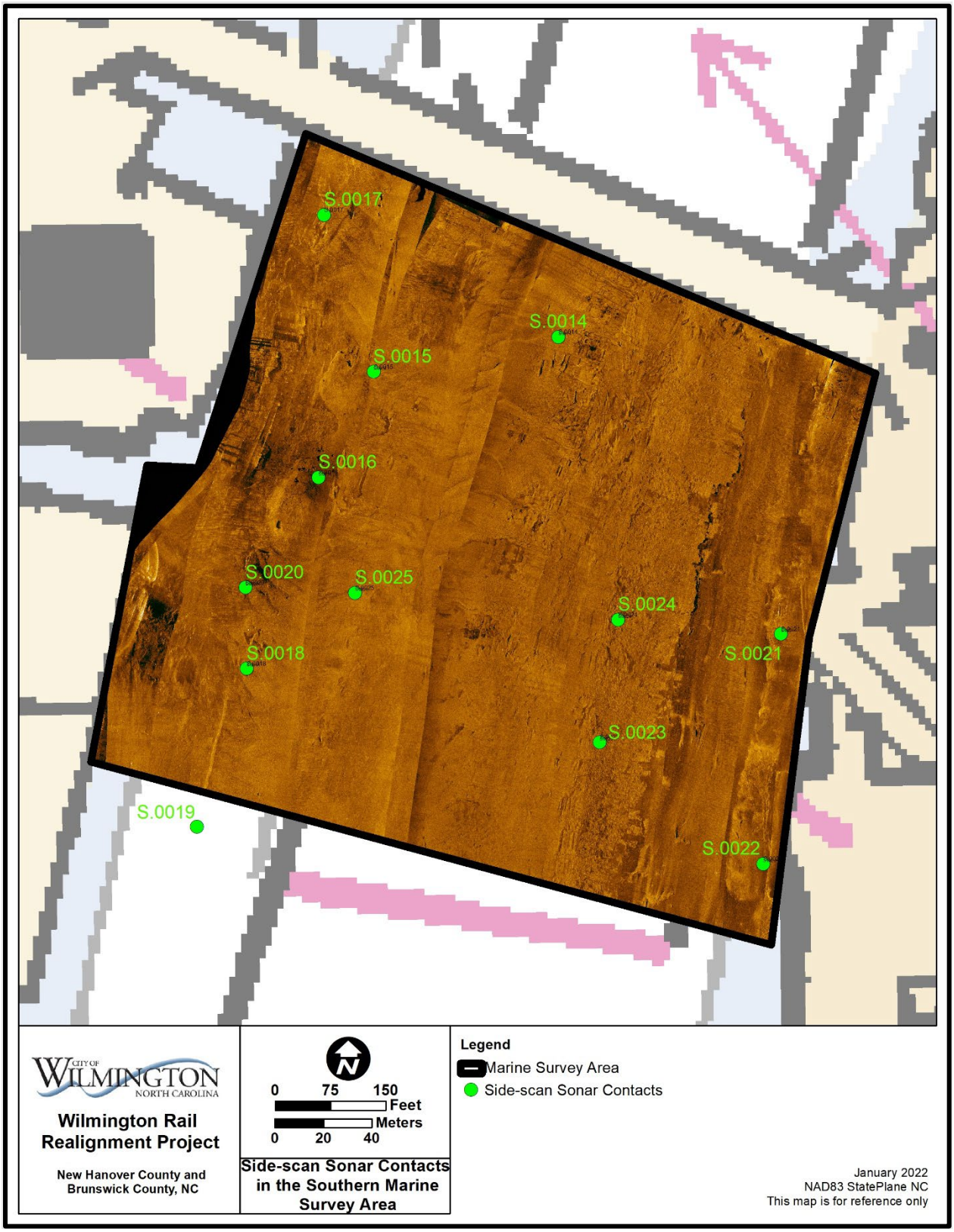


Figure 102: Historic Aerials Depicting Contact S.0021 and its Spatial Relationship to Previous Dock Infrastructure (Green arrow indicates the Contact Location).

6.4 TARGETS OF INTEREST

6.4.1 Target N.1

Target N.1 is located in the approximate center of the northern marine survey area, near the eastern boundary at a depth of 37 ft (11.3 m). The magnetic signature consists of the dipolar anomaly, M.002N (Figures 103 and 104). The dipole spans the width of three survey transects

and has a residual strength of 160 nT (-30 nT to 135 nT). Acoustic imagery depicts Contact S.0010 in close proximity (27 ft [8.2 m] away), immediately located outside the eastern APE boundary. It is unclear if S.0010 is associated with the dipole or if the anomaly indicates a buried source. Additionally, because Target N.1 is located immediately adjacent to the APE boundary, the entire magnetic field was not recorded; however, the principal dipole was captured, which allows for further evaluation.

The dipole shares some characteristics with verified shipwreck signatures. It has a magnetic declination of 20.4 degrees, approximately 29.9 degrees from magnetic north at the time of survey. This is outside the ±26-degree parameters, but close enough to warrant additional evaluation. The anomaly has an amplitude ratio of 1:4.5 and an amplitude gradient of 7.96 nT/ft. The amplitude ratio is marginally higher than observed in verified shipwrecks, and the amplitude gradient is consistent with shipwreck sources.

Acoustic imagery of Contact S.0010 depicts several linear objects. The scatter measures 107.8 ft (32.8 m) long and 43.8 ft (13.3 m) wide. It has a maximum vertical relief of 1.8 ft (0.5 m) above bottom sediments. The contact does not retain any structural integrity and does not have a shape that would indicate a disarticulated shipwreck.

Based on the magnetic variables including amplitude ratio and amplitude gradient, AECOM recommends avoidance of Target N.1 by a distance of 100 ft (30 m). The avoidance area is designed to account for any potentially buried material associated with the target. If avoidance is not possible, AECOM recommends additional archaeological investigation to determine the source of the anomaly and assess its integrity and potential historical significance.

Figure 103: Acoustic Imagery of Contact S.0010.

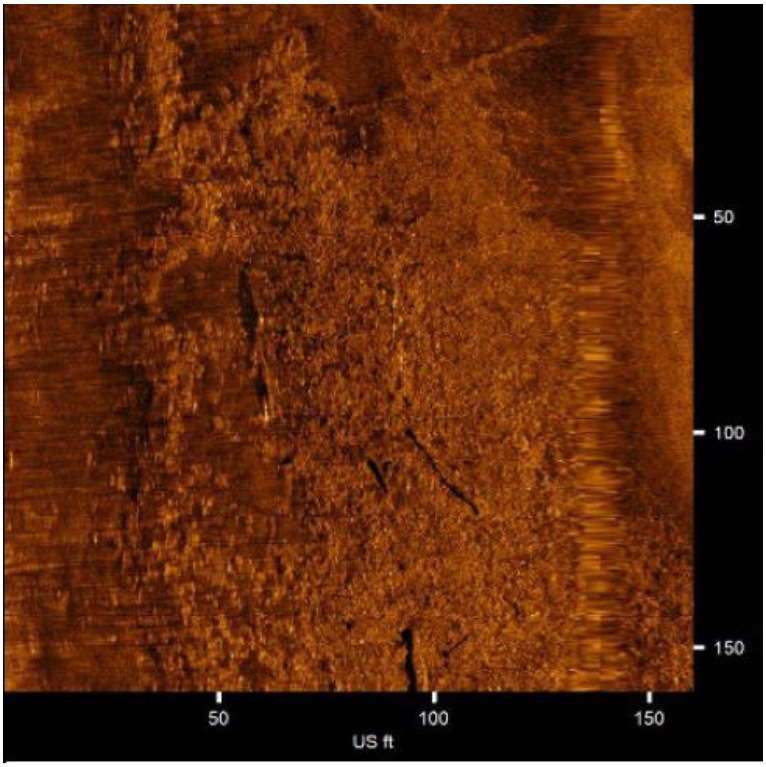
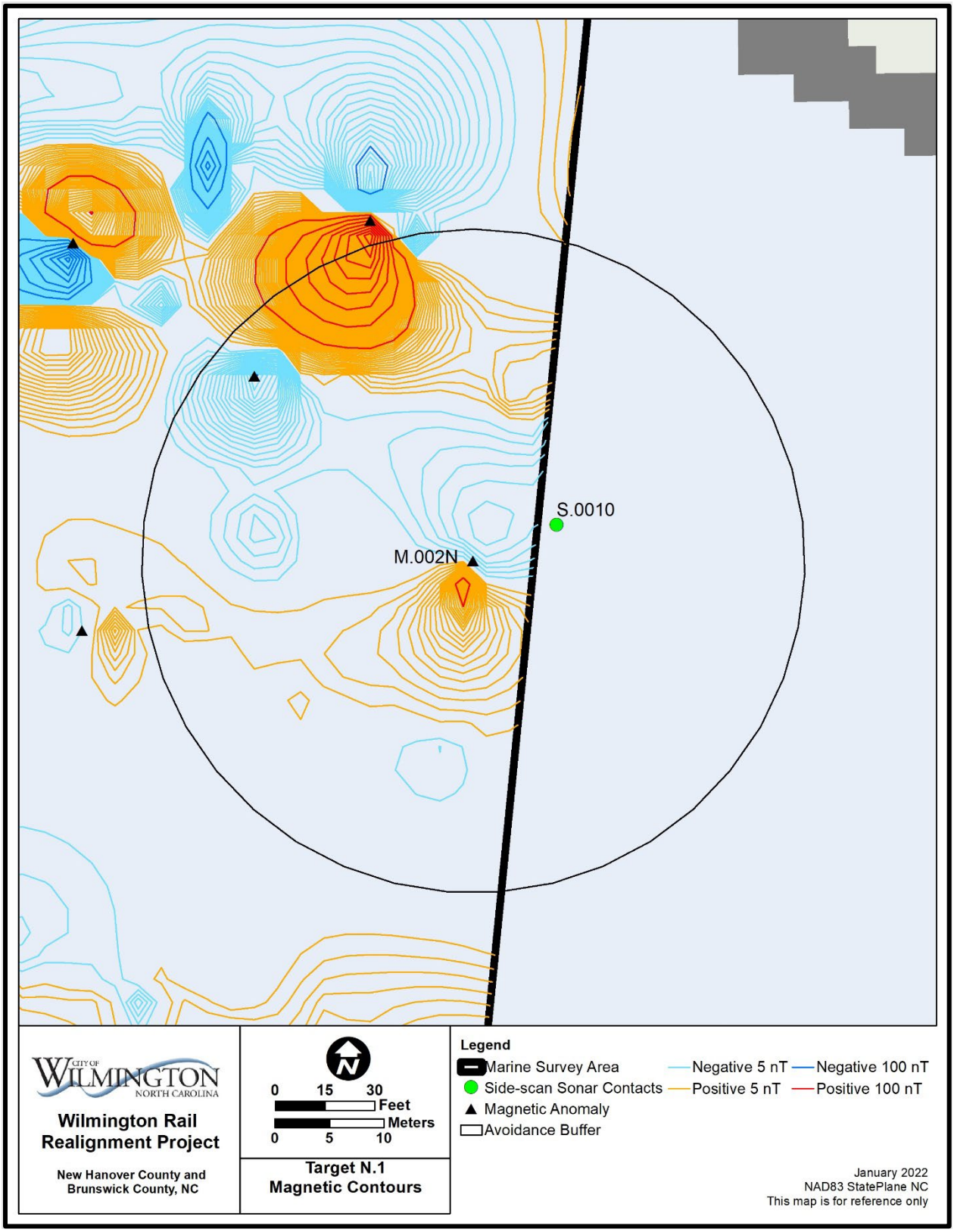


Figure 104: Magnetic Contours Associated with Target N.1.



6.4.2 Target N.2

Target N.2 is located in the approximate center of the northern marine survey area, near the southern shoreline at a depth of 29 ft (8.8 m). The magnetic signature consists of the dipolar anomaly, M.003N, which spans the width of two survey transects and has a residual strength of 145 nT (-35 nT to 110 nT) (Figure 105). Acoustic imagery did not depict any exposed objects on the riverbed. This suggests a buried source for the magnetic anomaly.

The dipole shares characteristics with verified shipwreck signatures. It has a magnetic declination of 12.7 degrees, approximately 22.2 degrees from magnetic north at the time of the survey. It has an amplitude ratio of 1:3.1 and an amplitude gradient of 5.9 nT/ft. Both of these values are consistent with observations made on shipwreck sites.

Based on the magnetic variables including magnetic declination, amplitude ratio, and amplitude gradient, AECOM recommends avoidance of Target N.2 by a distance of 100 ft (30 m). The avoidance area is designed to account for any potentially buried material associated with the target. If avoidance is not possible, AECOM recommends additional archaeological investigation (i.e., diver investigation) to determine the source of the anomaly and assess its integrity and potential historical significance.

6.4.3 Target N.3

Target N.3 is located in the approximate center of the northern marine survey area, along the southern shoreline at a depth of 23 ft (7.0 m). The magnetic signature is heavily influenced from the concentration of pilings located along the southern shoreline; however, a dipolar anomaly, M.021N, can be discerned from the surrounding interference. The dipole spans the width of one survey transect and has a residual strength of 90 nT (-25 nT to 65 nT) (Figure 106). Acoustic imagery does not depict any immediate exposed objects on the riverbed and side-scan sonar Contacts S.0006 and S.0007, both debris scatters, are located 93 and 63 ft (28.3 and 19.2 m) away, respectively. This suggests a buried source for the magnetic anomaly observed for Target N.3.

The dipole shares some characteristics with verified shipwreck signatures. It has a magnetic declination of 319.8 degrees, approximately 30.7 degrees from magnetic north at the time of survey. This is outside the ±26-degree parameters, but close enough to warrant additional evaluation. It has an amplitude ratio of 1:2.6 and an amplitude gradient of 9.1 nT/ft. Both of these values are consistent with verified shipwreck sources.

Based on the magnetic variables including amplitude ratio and amplitude gradient, AECOM recommends avoidance of Target N.3 by a distance of 100 ft (30 m). The avoidance area is designed to account for any potentially buried material associated with the target. If avoidance is not possible, AECOM recommends additional archaeological investigation (i.e., diver investigation) to determine the source of the anomaly and assess its integrity and potential historical significance.

Figure 105: Magnetic Contours Associated with Target N.2.

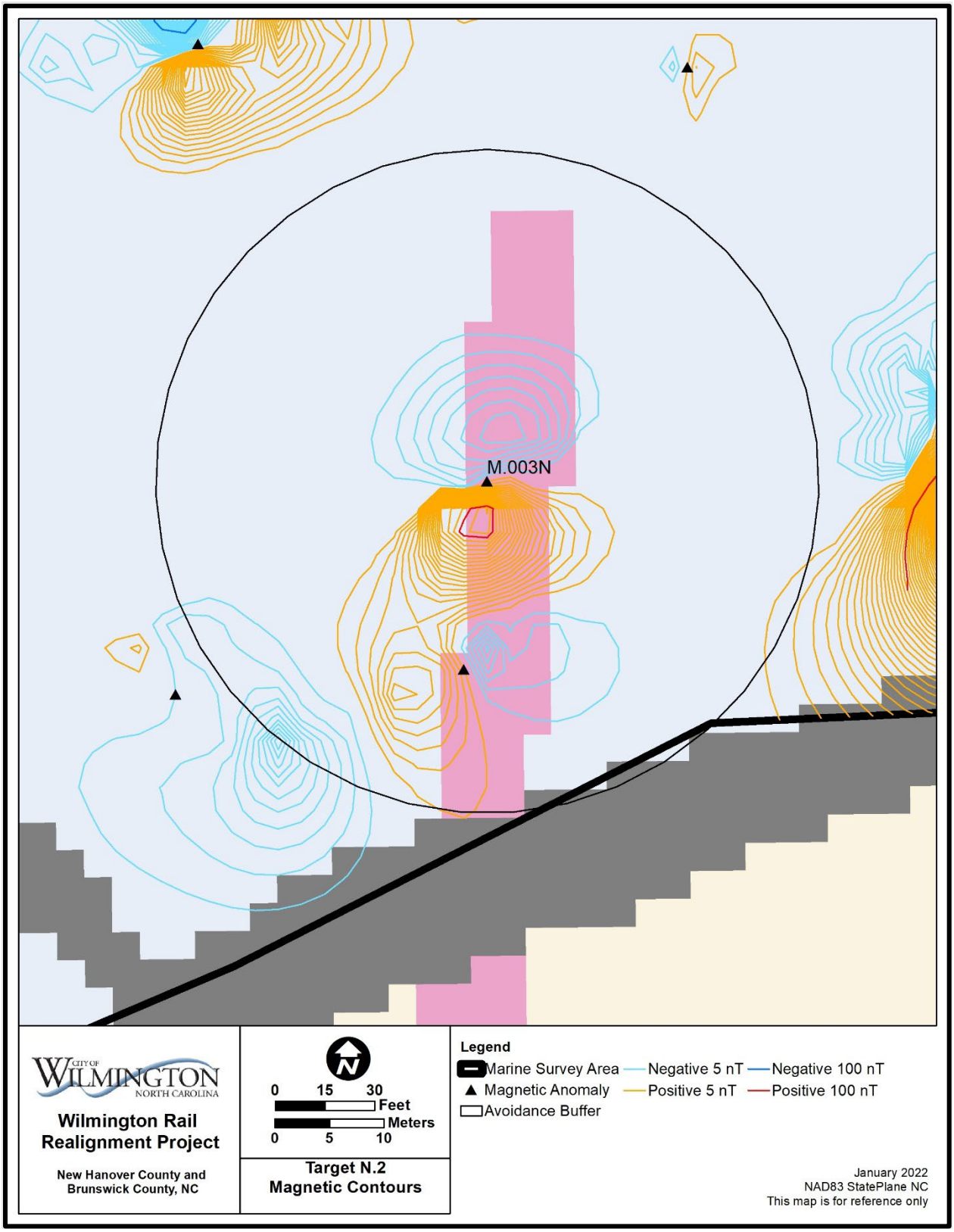
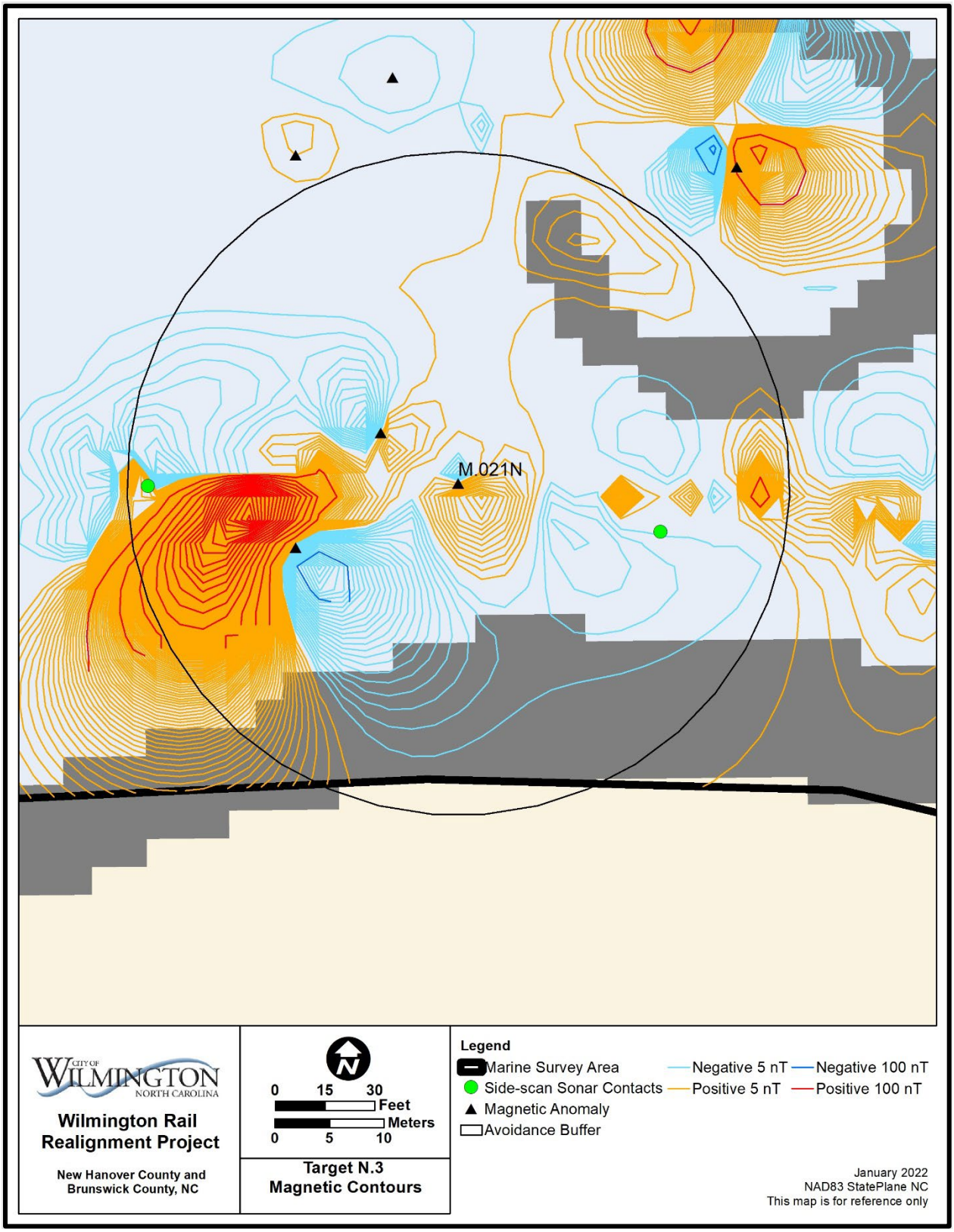


Figure 106: Magnetic Contours Associated with Target N.3.



6.4.4 Target N.4

Target N.4 is located in the eastern portion of the northern marine survey area, near the southern shoreline at a depth of 26 ft (7.9 m). The magnetic signature consists of a dipolar anomaly, M.029N (Figure 107). The dipole spans the width of two survey transects and has a residual strength of 40 nT (-15 nT to 35 nT). Acoustic imagery does not depict any exposed objects on the riverbed. This suggests a buried source for the magnetic anomaly. The dipole shares some characteristics with verified shipwreck signatures. It has a magnetic declination of 355.2 degrees, approximately 4.7 degrees off magnetic north at the time of survey. It has an amplitude ratio of 1:2.3 and an amplitude gradient of 0.97 nT/ft. The amplitude ratio is consistent with verified shipwreck sources; however, the amplitude gradient is much lower than anticipated for potential shipwreck sources. This may indicate a highly scattered cultural resource, which has since been buried.

Based on the magnetic variables including magnetic declination and amplitude ratio, AECOM recommends avoidance of Target N.4 by a distance of 100 ft (30 m). The avoidance area is designed to account for any potentially buried material associated with the target. If avoidance is not possible, AECOM recommends additional archaeological investigation (i.e., diver investigation) to determine the source of the anomaly and assess its integrity and potential historical significance.

6.4.5 Target S.1

Target S.1 is located along the southern boundary of the southern marine survey area, adjacent to the western shoreline, at a depth of 24 ft (7.3 m). The magnetic signature is heavily influenced by interference from shoreline infrastructure; however, a dipolar anomaly, M.003S, can be discerned from the surrounding interference (Figure 108). The dipole spans the width of three survey transects and has a residual strength of 445 nT (-195 nT to 250 nT). Acoustic imagery did not depict any exposed objects on the riverbed. This suggests a buried source for the magnetic anomaly. The dipole shares some characteristics with verified shipwreck signatures. It has a magnetic declination of 356.5 degrees, approximately 6.0 degrees from magnetic north at the time of survey. It has an amplitude ratio of 1:1.3 and an amplitude gradient of 20.9 nT/ft. The amplitude ratio is characteristic of shipwreck sources. The amplitude gradient is consistent with iron hulled shipwrecks or shipwrecks with significant amounts of ferromagnetic material. It should be noted that the high amplitude gradient is likely heavily influenced by interference from shoreline infrastructure.

Based on the magnetic variables including magnetic declination and amplitude ratio, AECOM recommends avoidance of Target S.1 by a distance of 100 ft (30 m). The avoidance area is designed to account for any potentially buried material associated with the target. If avoidance is not possible, AECOM recommends additional archaeological investigation (i.e., diver investigation) to determine the source of the anomaly and assess its integrity and potential historical significance.

Figure 107: Magnetic Contours Associated with Target N.4.

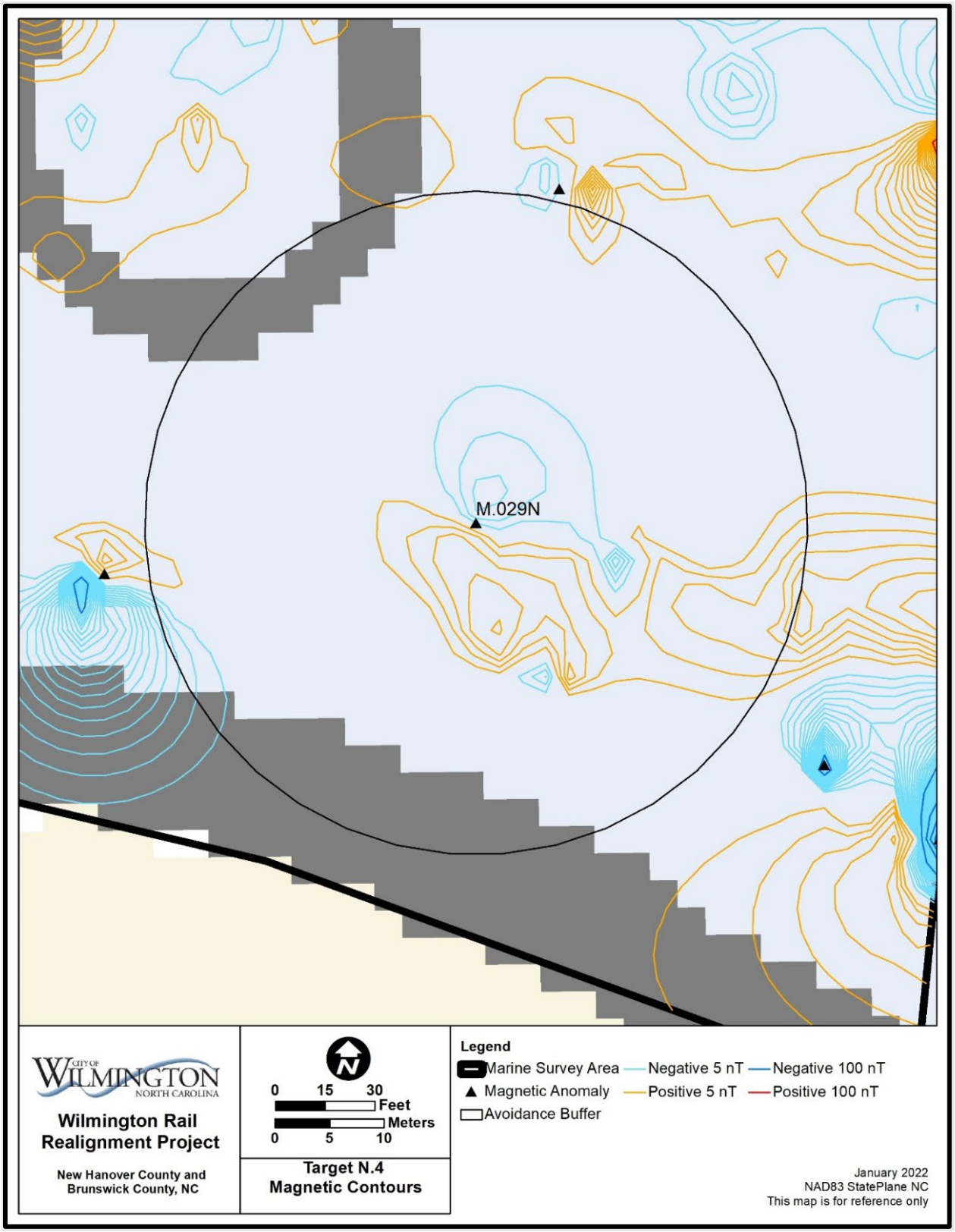
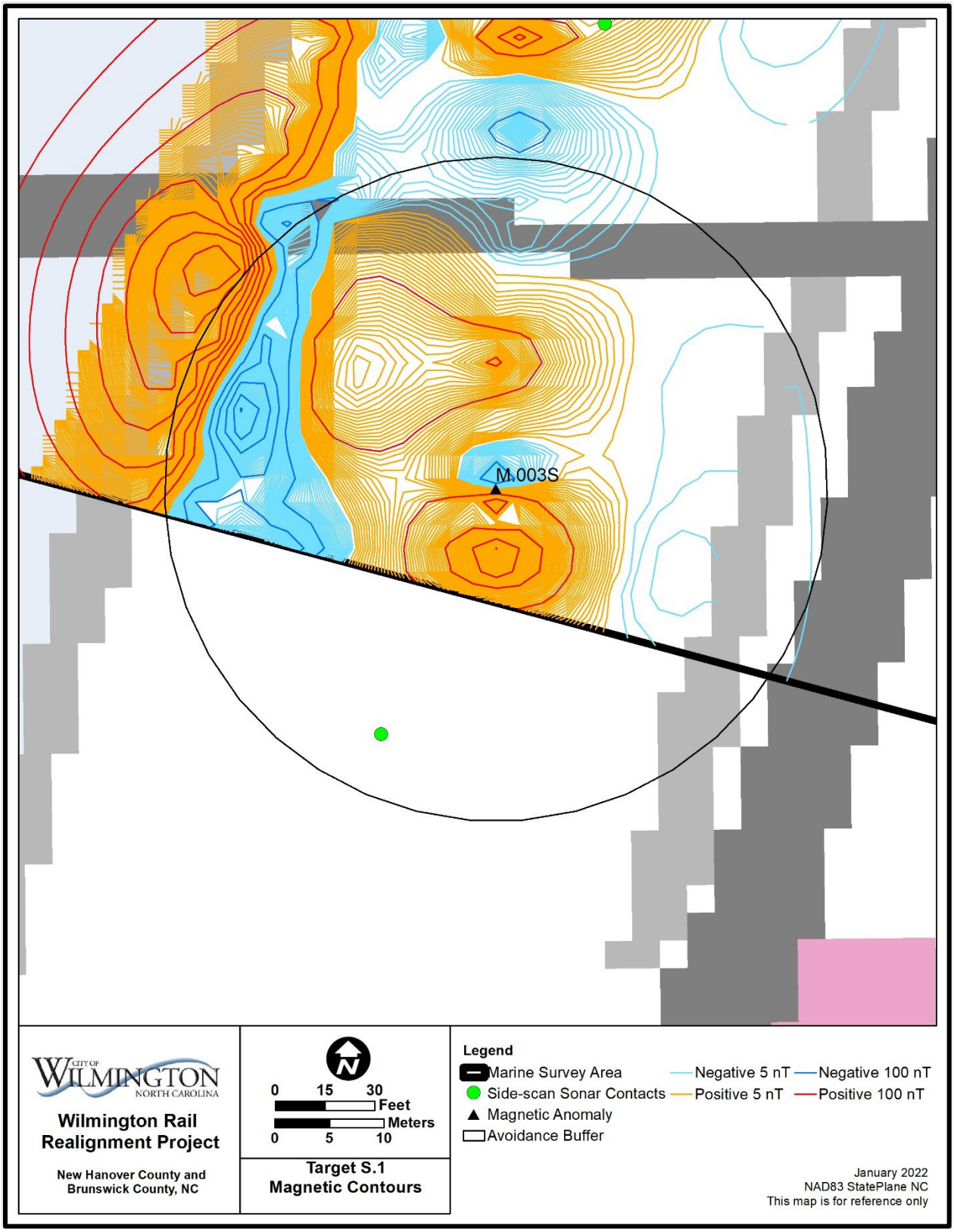


Figure 108: Magnetic Contours Associated with Target S.1.



6.4.6 Target S.2

Target S.2 is located in the central portion of the southern marine survey area, near the western shoreline at a depth of 32 ft (9.8 m). The magnetic signature consists of the dipolar anomaly, M.008S, which spans the width of one survey transect and has a residual strength of 80 nT (-35 nT to 45 nT) (Figure 109). Acoustic imagery did not depict any exposed objects on the river bottom. This suggests a buried source for the magnetic anomaly. The dipole shares characteristics with verified shipwreck signatures. It has a magnetic declination of 3.6 degrees, 13 degrees off magnetic north at the time of survey. It has an amplitude ratio of 1:1.3 and an amplitude gradient of 11.4 nT/ft. Both of these values are consistent with verified shipwreck sources. The amplitude gradient is higher than what would be expected from a wooden-hulled sailing vessel, but it is not outside the upper limits of potential cultural resources.

Based on the magnetic variables including magnetic declination, amplitude ratio, and amplitude gradient, AECOM recommends avoidance of Target S.2 by a distance of 100 ft (30 m). The avoidance area is designed to account for any potentially buried material associated with the target. If avoidance is not possible, AECOM recommends additional archaeological investigation (i.e., diver investigation) to determine the source of the anomaly and assess its integrity and potential historical significance.

6.4.7 Target S.3

Target S.3 is located in the northwestern corner of the southern marine survey area, adjacent to the western shoreline and directly south of the Cape Fear Memorial Bridge, at a depth of 21 ft (6.4 m). Due to interference created by the bridge, no discernable magnetic signature could be identified (Figures 110 and 111). Acoustic imagery depicts Contact S.0017, a debris scatter. The target measures approximately 107.5 ft (32.7 m) long and 92.6 ft (28.2 m) wide. The target has a maximum vertical relief of 1.2 ft (0.4 m) above bottom sediments. No previously recorded shipwreck locations are found within 200 ft (61 m) of the target. The debris scatter consists of several linear and point objects. No structural integrity remains between the linear and point objects that make up the debris scatter. Nonetheless, the shape of the debris scatter has an approximate vessel shape that may indicate a potentially partially buried and disarticulated wreck. This is supported by its close proximity to bridge footings. Bridge footings create strong currents, as noted during field investigations, and these may have helped break up a potential shipwreck.

Based on acoustic imagery, AECOM recommends avoidance of Target S.3 by a distance of 164 ft (50 m). The larger avoidance are accounts for the larger dimensions are designed to account for the exposed and potentially buried material associated with the target. If avoidance is not possible, AECOM recommends additional archaeological investigation (i.e., diver investigation) to determine the source of the anomaly and assess its integrity and potential historical significance.

Figure 109: Magnetic Contours Associated with Target S.2.

Figure 110: Magnetic Contours Associated with Target S.3.

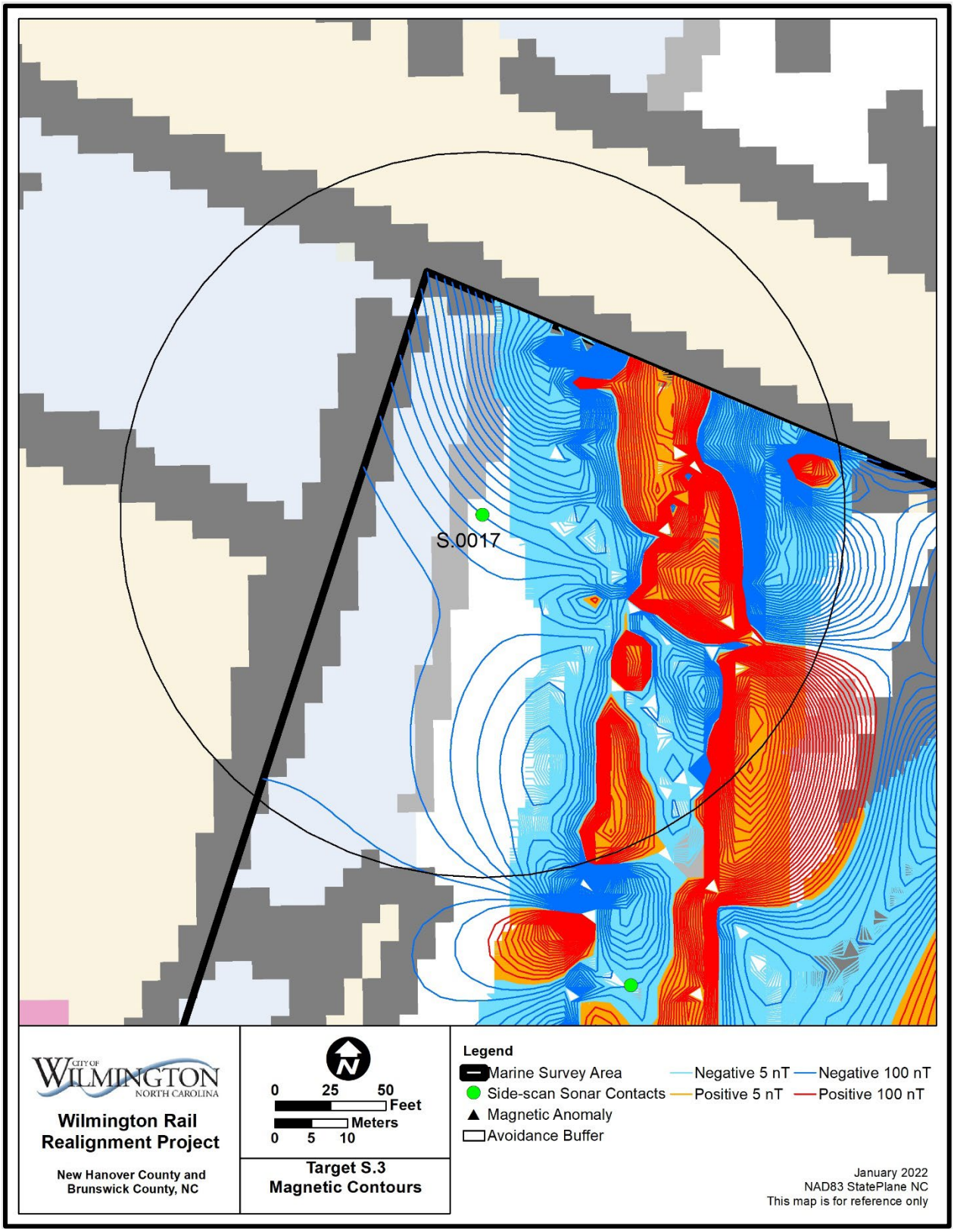
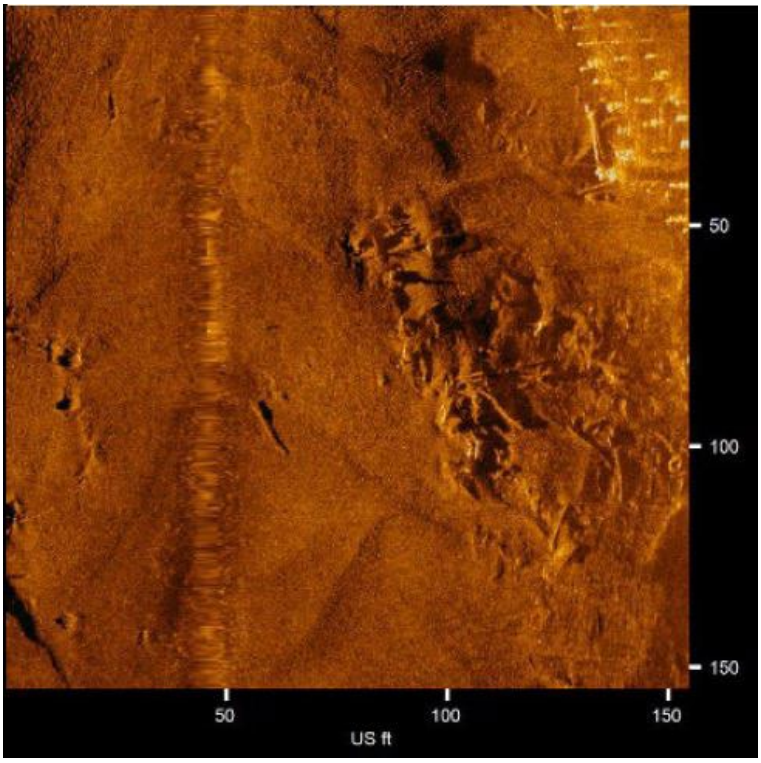


Figure 111: Acoustic Imagery of Target S.3 (Contact S.0017).



6.5 SUBBOTTOM PROFILER RESULTS

With regards to the subbottom profiler record, data seem to indicate that the marine survey areas consist of unconsolidated sediments (mostly sand with finer grain silt and clay) to the depth of the instrument capability—typically between 10 and 15 ft (3 to 4.5 m). The seismic records were dominated by a surface facies composed of coarse sediment along the center of the channel with occasional bedforms and finer grain sediments nearer to the shoreline. Representative profiles are presented below for the northern marine survey area (Figure 112) and the southern marine survey area (Figure 113). Analysis of the data revealed no reflectors that might represent a buried surface, paleochannel, positive relief feature, or other buried geomorphological feature. No further work regarding potential submerged prehistoric archaeological sites is recommended.

Figure 112. Example Subbottom Profiler Record. Profile Data are taken from Line N_4 in the northern marine survey area, Running from East (left) to West (right) (*Note the lack of subsurface features and the surface facies composed of mostly sand. This profile is provided in both unannotated [above] and annotated [below]).

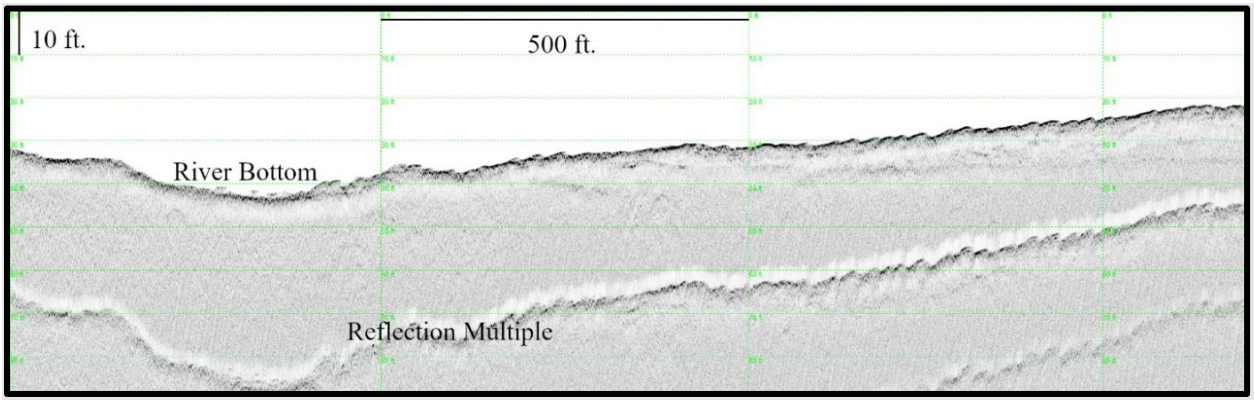
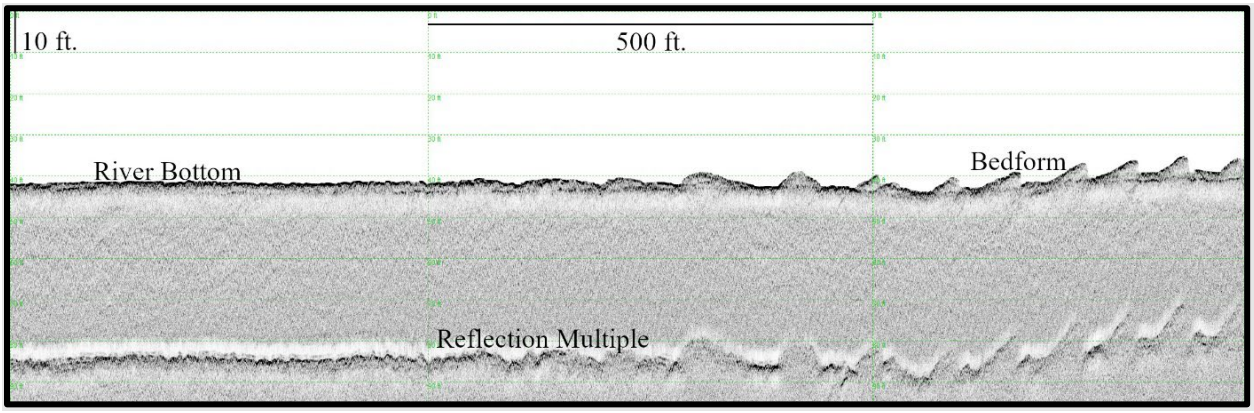


Figure 113. Example Subbottom Profiler Record. Profile data are taken from Line S_9 in the southern marine survey area. Profile runs from south (left) to north (right) (*Note profiles from this portion of the survey area lack any visible reflectors that might represent buried geomorphological features. The surface facies are composed of sand with bedforms visible to the north).



7.0 DIVE INVESTIGATION RESULTS

The following section describes the diving results at each marine archaeological target. AECOM performed diver investigations between 22-28 March 2023 and completed a total of 16 dives. Generally, weather during the diver investigation was optimal with clear, sunny weather, except for a single overcast day. Water temperatures ranged from 58° Fahrenheit (F) to 62° F, and water visibility less than 1.0 ft (0.3 m). Significant tidal flows within both marine survey areas restricted dive operations to periods of slack tide. In the northern marine survey area, AECOM personnel noted several derelict pilings or telephone poles on the southern riverbank and wharfing infrastructure such as dolphins and docks on the northern riverbank (see Figure 88 and Figure 114). Within the southern survey area, all targets are located adjacent to an active tugboat dock (Figure 115). Targets N.1-N.4 are located in the northern marine survey area, and Targets S.1-S.3 are located in the southern marine survey area (Figure 116 Figure 117).

Figure 114: Pilings located along adjacent to Target N.3. Facing south.

Figure 115: Tugboats located adjacent to Targets S.1-S.3. Facing northwest.

Figure 116. Location of Dive Targets in the Northern Marine Survey Area.

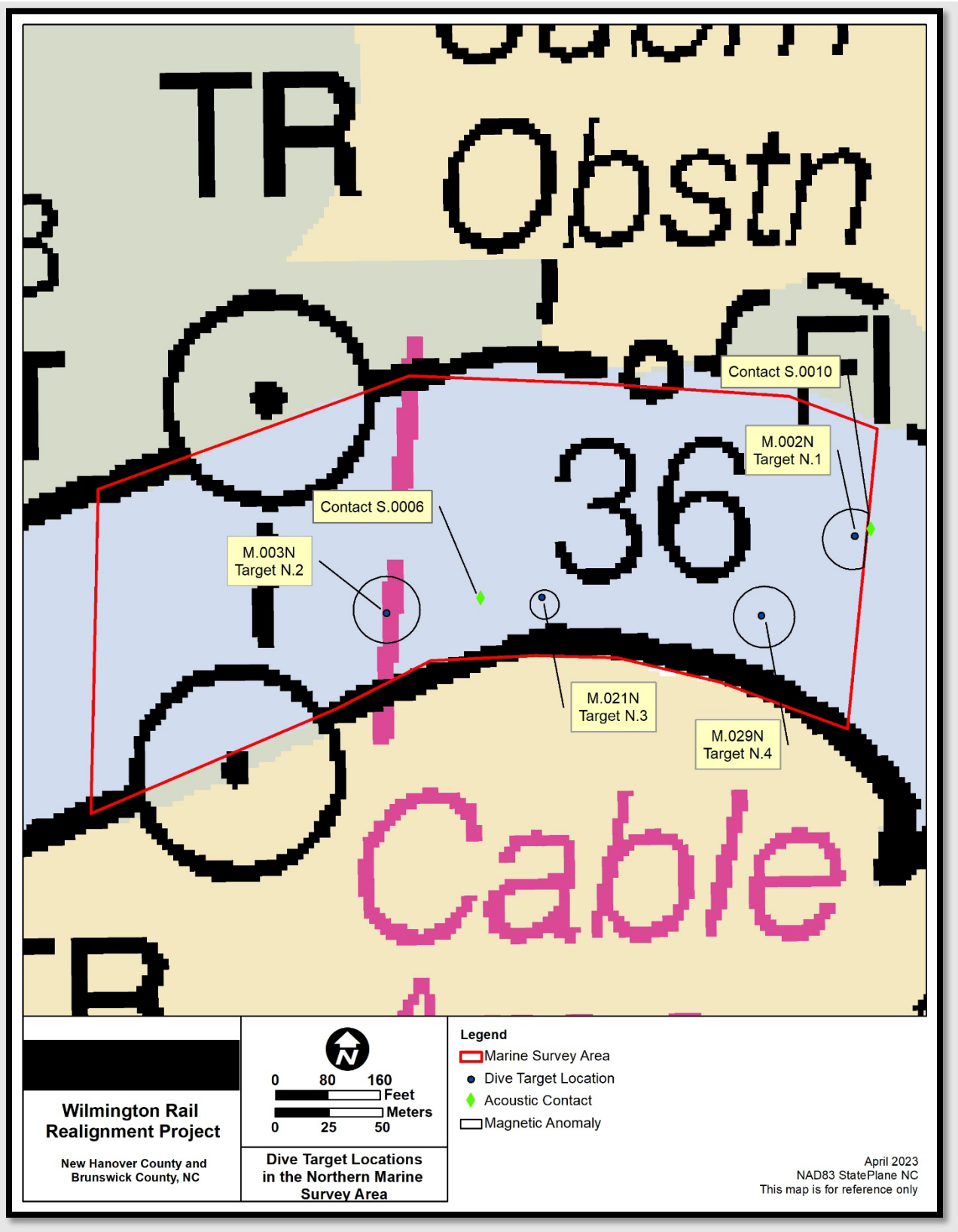
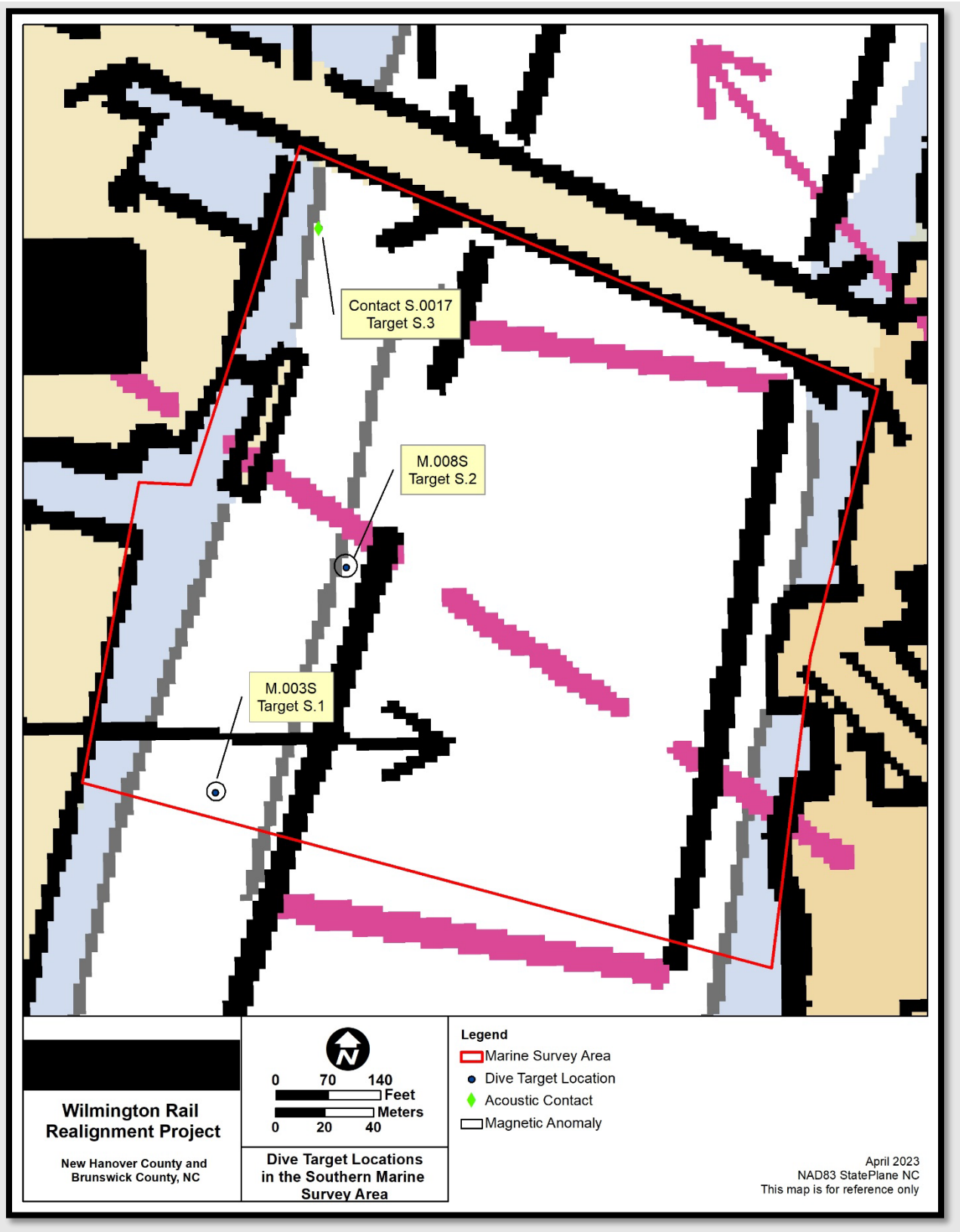


Figure 117. Location of Dive Targets in the Southern Marine Survey Area.



7.1 TARGET N.1

Target N.1 consists of magnetic anomaly M.002N, located near the eastern boundary of the northern marine survey area in 40 ft (12.2 m) of water. Acoustic contact S.0010 is potentially associated with the target but located outside the marine survey area boundaries. Divers spent 60 minutes investigating Target N.1 and recorded metal detector returns within an area approximately 2.5 by 2.5 ft (0.8 m by 0.8 m). Source objects consisted of ferrous modern debris, such as small single source objects and unidentified metal concretions (Figure 118). Divers observed a weathered sandstone bottom that did not permit penetration by the T-probe. No other metal detector returns or structural remains indicating a submerged cultural resource were encountered. AECOM marine archaeologists determined the modern debris field to be the likely source of the magnetic signature associated with Target N.1.

Figure 118: Example of Unidentified Metal Concretion

7.2 TARGET N.2

Target N.2 consists of magnetic anomaly M.003N located near the approximate center of the northern marine survey area adjacent to the southern riverbank in 37 ft (11.3 m) of water. Divers spent 40 minutes investigation Target N.2 and recorded a large metal box measuring 4.0 ft by 4.0 ft (1.2 m by 1.2 m). The box is made of a chicken wire-type material and likely represents a derelict crab or lobster trap. No other metal detector returns or structural remains indicating a submerged cultural resource were identified via probing up to 4.0 ft (1.2 m) below the riverbed. AECOM marine archaeologists determined the metal box to be the likely source of the magnetic signature associated with Target N.2.

7.3 TARGET N.3

Target N.3 consists of magnetic anomaly M.021N located near the approximate center of the northern marine survey area, adjacent to the southern riverbank in 30 ft (9.1 m) of water. The target was partially associated with acoustic contact S.0006, a debris field consisting of several logs or pilings. Divers spent 52 minutes investigating Target N.3 and recorded a broken section of cable measuring approximately 2.0 ft (0.6 m) long and 0.5 in (1.6 cm). Divers also confirmed that the debris consisted of pilings or telephone poles embedded with several large nails. Identified pilings/poles are similar to those found on the riverbank adjacent to the target (see Figure 88 and Figure 114). No buried structural remains indicating a submerged cultural resource were identified via probing up to 4.0 ft (1.2 m) below the riverbed. AECOM marine archaeologists determined the poles and cable to be the likely source of the magnetic signature associated with Target N.3.

7.4 TARGET N.4

Target N.4 consists of magnetic anomaly M.029N located in the eastern portion of the northern marine survey area in 35 ft (10.7 m) of water. Divers spent 80 minutes investigating Target N.4 and a recorded metal detector returns within an area approximately 2.0 ft by 2.0 ft (0.6 m by 0.6 m). Source objects consisted of ferrous modern debris, such as small single source objects and unidentified metal concretions. No further positive metal detector returns or structural remains indicating a submerged cultural resource were identified via probing up to 4.0 ft (1.2 m) below the riverbed. AECOM marine archaeologists determined the debris field to be the likely source of the magnetic signature associated with Target N.4.

7.5 TARGET S.1

Target S.1 consists of magnetic anomaly M.003S located near the southern boundary of the southern marine survey area in 32 ft (9.8 m) of water. Divers spent 60 minutes investigating Target S.1 and recorded several small metal detector returns on all radials. Source objects consisted of modern ferrous debris, such as small single source objects and unidentified metal concretions. A silty mud bottom extended 6.0 in (15.2 cm) deep and was underlain by hardpacked sand that restricted penetration by the T-handle. No structural remains indicating a submerged cultural resource were identified in the upper 6.0 in (15.2 cm) below the riverbed. AECOM marine archaeologists determined the several single source debris objects possibly

related to the active tugboat facility near the target to be the likely source of the magnetic signature associated with Target S.1.

7.6 TARGET S.2

Target S.2 consists of magnetic anomaly M.008S located in the central portion of the southern marine survey area in 35 ft (10.7 m) of water. Divers spent 56 minutes investigating Target S.2 and recorded several small metal detector returns on all radials. Source objects consisted of modern ferrous debris, such as small single source objects and unidentified metal concretions. A silty mud bottom extended 6.0 in (15.2 cm) deep and was underlain by hardpacked sand that restricted penetration by the T-handle. No structural remains indicating a submerged cultural resource were identified in the upper 6.0 in (15.2 cm) below the riverbed. AECOM marine archaeologists determined the several single source debris objects possibly related to the active tugboat facility to be the likely source of the magnetic signature associated with Target S.2.

7.7 TARGET S.3

Target S.3 consists of acoustic contact S.0017 located in the northwestern corner of the southern marine survey area, adjacent to the Cape Fear Memorial Bridge, in 23 ft (7.0 m) of water. Divers spent 54 minutes investigating Target S.3 and recorded several exposed objects including tree branches, a small piling, and a 4-inch (10-centimeter) diameter pipe approximately 3.0 ft (0.9 m) long. AECOM marine archaeologists determined the several exposed objects possibly related to the active tugboat facility to be the likely source of the acoustic contact associated with Target S.3.

7.8 SUMMARY OF DIVER INVESTIGATIONS

In summary, the seven targets subjected to scientific diving all represent modern debris in the river. None are old enough to be considered of an archaeological or historic nature, and therefore have not been assigned state site numbers. No further underwater archaeological work is recommended for either river crossing of the WRR project.

8.0 SUMMARY AND RECOMMENDATIONS

8.1 SUMMARY

The terrestrial survey revisited one previously recorded site and identified one new archaeological site. Site 31NH686, originally defined as a 20th century railroad causeway and turntable, was revisited during this project. The current survey refined the site boundary, refined the temporal affiliation as a late-19th to early-20th century causeway, and identified an isolated prehistoric component. Site 31NH895 is a newly identified 19th century domestic scatter and 20th century railroad causeway with an isolated prehistoric component.

The underwater survey identified a total of 46 magnetic anomalies, 25 side-scan sonar targets, and no subbottom paleofeatures. Correlated datasets resulted in the identification of seven targets, N.1-N.4 and S.1-S.3, which may represent submerged cultural resources.

8.2 RECOMMENDATIONS

Sites 31NH686 and 31NH895 are recommended as ineligible for the NRHP. This recommendation is based on low densities of artifacts and/or their recovery from disturbed contexts. No further work is recommended at these two sites.

Seven marine archaeological targets (N.1-N.4 and S.1-S.3) were identified during marine remote-sensing surveys that occurred in November 2021. In March 2023, AECOM scientific divers completed dive investigations of all seven targets. The likely sources for all seven were determined to be either modern debris and/or natural features on the riverbed. The seven locations do not constitute historic resources due to lack of age. No further archaeological work is recommended at any of the seven identified targets.

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APPENDIX A

Artifact Catalog

FS.Entry#	Site#	Provenience	Artifact Count	Group	Material	Object	Color	Ware/ Technology/ Species	Decoration	Comments	Date	Reference	Weight (grams)
1.1	31NH686	STP A1, Strat III	3	Prehistoric, Storage/Cooking	Ceramic, Clay	Residual Sherd,			Unidentified-		-		0.55
1.2	31NH686	STP A1, Strat III	2	Prehistoric, Storage/Cooking	Ceramic, Clay	Pottery Sherd, Rim Sherd	Brown, Light		Fabric-Impressed- Smoothed	mends; possible organic temper along with sand.	-		1.6
2.1	31NH686	STP B4, Strat I	3	Historic, Fuel	Lithic, Coal	Coal Fragment,					-		18.6
2.2	31NH686	STP B4, Strat I	2	Historic, Fuel	Lithic, Coal	Cinder, Fragment					-		13.7
3.1	31NH686	STP B5, Strat II	5	Historic, Architectural	Glass, Common Glass	Window Glass, Fragment	Aqua				-		8.9
3.2	31NH686	STP B5, Strat II	1	Historic, Indeterminate	Glass, Non-Lead Glass	Indeterminate, Fragment	Colorless	Indeterminate		Thick flat fragment of colorless glass.	-		4.8
3.3	31NH686	STP B5, Strat II	1	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Fragment,	Orange			Small brick fragment.	-		0.8
3.4	31NH686	STP B5, Strat II	2	Historic, Indeterminate	Lithic, Slate	Indeterminate, Fragment	Gray			Indeterminate slate fragments.	-		5.3
3.5	31NH686	STP B5, Strat II	1	Unknown, Indeterminate	Lithic, Granite	Indeterminate, Fragment	Pink			Thin fragment of granite, no polished surfaces.	-		1.4
4.1	31NH686	STP B6, Strat I	7	Historic, Fuel	Lithic, Coal	Coal Fragment,					-		7.2
4.2	31NH686	STP B6, Strat I	2	Historic, Indeterminate	Lithic, Slate	Indeterminate, Fragment	Gray			Small indeterminate slate fragments.	-		0.9
4.3	31NH686	STP B6, Strat I	2	Historic, Architectural	Glass, Common Glass	Window Glass, Fragment	Aqua				-		1.7
4.4	31NH686	STP B6, Strat I	1	Historic, Indeterminate	Metal, Lead	Indeterminate, Fragment				Indeterminate fragment of lead, rusted and melted due to burning.	-		8.9
5.1	31NH686	STP B7, Strat I	1	Historic, Architectural	Glass, Non-Lead Glass	Window Glass, Fragment	Colorless				-		1.5
6.1	31NH895	Surface Find 1	1	Historic, Personal	Ceramic, Refined Earthenware	Button, Complete		Porcelain, Hard Paste Pressed		Four holed Prosser button, dish type.	1840-1960	Sprague 2002	0.5
7.1	31NH895	Surface Find 2	1	Historic, Household	Ceramic, Refined Earthenware	Indeterminate, Base Sherd		Pearlware	Indeterminate	Base sherd with round tooled foot ring, no decoration present.	1775-1840	Azizi et al 1996	5.8
8.1	31NH895	STP C1, Strat I	3	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Fragment,	Red			Small brick fragments.	-		5.2
8.2	31NH895	STP C1, Strat I	3	Historic, Indeterminate	Metal, Iron	Indeterminate, Fragment				Metal fragments melted due to burning.	-		4.7
8.3	31NH895	STP C1, Strat I	1	Historic, Indeterminate	Metal, Iron	Indeterminate, Fragment				Heavily rusted fragment of metal, possibly a nail fragment.	-		3.8
9.1	31NH895	STP C3, Strat I	1	Prehistoric, Storage/Cooking	Ceramic, Clay	Residual Sherd,			Unidentified		-		0.3
9.2	31NH895	STP C3, Strat I	1	Prehistoric, Storage/Cooking	Ceramic, Clay	Pottery Sherd, Body Sherd	Tan-Red		Fabric-Impressed- Smoothed	Interior burned.	-		4.7
10.1	31NH895	STP C3, Strat II	1	Historic, Household	Glass, Common Glass	Container Glass, Body Sherd	Olive	Indeterminate		Small curved body sherd.	-		1.1
10.2	31NH895	STP C3, Strat II	1	Historic, Household	Glass, Common Glass	Bottle, Base Sherd	Aqua	Mold Blown, Indeterminate		Rectangular/square bottle base sherd. Possible hinge mold, but not enough of base remains to say definitively. Heavy use wear visible.	-		3.3
10.3	31NH895	STP C3, Strat II	2	Historic, Household	Glass, Common Glass	Bottle, Body Sherd	Aqua	Mold Blown, Indeterminate		Small body sherds from a rectangular bottle.	-		1.2
10.4	31NH895	STP C3, Strat II	8	Historic, Indeterminate	Metal, Iron	Indeterminate, Fragment				Small indeterminate fragments of rusted metal.	-		7.1

FS.Entry#	Site#	Provenience	Artifact Count	Group	Material	Object	Color	Ware/ Technology/ Species	Decoration	Comments	Date	Reference	Weight (grams)
10.5	31NH895	STP C3, Strat II	1	Historic, Architectural	Metal, Iron	Spike, Railroad, Almost Complete		Square		Heavily rusted railroad spike with part of head missing. Cannot determine manufacturing technique more specifically.	-		251.7
10.6	31NH895	STP C3, Strat II	1	Historic, Personal	Fauna, Leather	Shoe, Fragment				Fragment of leather shoe sole.	-		8.1
11.1	31NH895	STP C3+15mN, Strat I	1	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Fragment,	Red			Small brick fragment.	-		12.3
12.1	31NH895	STP C4, Strat I	1	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Fragment,	Red			Small brick fragment.	-		19.4
12.2	31NH895	STP C4, Strat I	1	Historic, Architectural	Metal, Iron	Nail, Fragment		Indeterminate		Nail fragment, too rusted to determine manufacturing technique.	-		2
12.3	31NH895	STP C4, Strat I	2	Historic, Architectural	Metal, Iron	Nail, Almost Complete		Indeterminate		Almost complete nails, too rusted to determine manufacturing technique.	-		12.2
12.4	31NH895	STP C4, Strat I	1	Historic, Household	Glass, Common Glass	Container Glass, Body Sherd	Olive	Indeterminate		Curved body sherd.	-		5.7
12.5	31NH895	STP C4, Strat I	1	Historic, Household	Glass, Common Glass	Container Glass, Body Sherd	Olive	Mold Blown, Indeterminate	Embossed- - - Lettering	Small curved body sherd with indeterminate embossed lettering.	-		1.8
12.6	31NH895	STP C4, Strat I	1	Historic, Household	Ceramic, Refined Earthenware	Hollowware, Body Sherd		Red Bodied	Dipt- Double Glazed- Blue, Brown- Banded	Small body sherd with blue and brown dipt bands on exterior, no decoration present on interior.	1770-1920	www.jefpat.org	0.7
13.1	31NH895	Surface Find Near STP C4	1	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Almost Complete	Red	Handmade		Handmade brick, likely made from local clay (based on the inclusions). This brick has lime mortar adhered to it (as opposed to Portland cement). See extra information section for dating information.	-		1943.4
13.2	31NH895	Surface Find Near STP C4	2	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Fragment,	Red			Small brick fragments that spalled off of the brick in FS 13.1.	-		1.7
14.1	31NH895	STP JUD1, Strat I	2	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Almost Complete	Red	Handmade		Handmade brick, likely made from local clay (based on the inclusions).	-		1840.8
14.2	31NH895	STP JUD1, Strat I	22	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Fragment,	Red				-		33.3
15.1	31NH895	STP JUD2, Strat I	1	Historic, Household	Ceramic, Porcelain	Hollowware, Body Sherd		Porcelain, Chinese Export	Painted- - Blue- Indeterminate	Not enough decoration remains to identify pattern.	-		3.8
15.2	31NH895	STP JUD2, Strat I	4	Historic, Household	Ceramic, Refined Earthenware	Indeterminate, Body Sherd		Whiteware	Indeterminate	Small sherds, no decoration visible. Sherds mend.	1815-	Azizi et al 1996	2.9
15.3	31NH895	STP JUD2, Strat I	2	Historic, Household	Ceramic, Refined Earthenware	Hollowware, Body Sherd		Yellowware	Dipt- - White- Banded	Six ,thin dipt lines visible. Sherds mend.	1845-1920	www.jefpat.org	1.9
15.4	31NH895	STP JUD2, Strat I	1	Historic, Architectural	Ceramic, Coarse Earthenware	Brick, Complete	Red	Handmade		Handmade brick, likely made from local clay (based on the inclusions). Given the irregular form & fragments of other brick adhered to it, this brick may be a kiln waster. Some glaze present, probably as a result of over-firing.	-		2008.5

FS.Entry#	Site#	Provenience	Artifact Count	Group	Material	Object	Color	Ware/ Technology/ Species	Decoration	Comments	Date	Reference	Weight (grams)
16.1	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Glass, Common Glass	Bottle, Finish	Colorless	Mouth Blown, General		Based on the photo, it looks like an applied patent finish. Applied patent finishes have a date range of 1850-1895 (http://www.sha.org/bottle/finishstyles.htm).	-		0.001
16.2	31NH895	2016 Lee Amateur Collection	4	Historic, Household	Glass, Common Glass	Bottle, Body/Rim Sherd	Aqua	Mouth Blown, General		Based on the photo, it looks like an applied double ring finish. Applied double ring finishes have a date range of 1840-1895 (http://www.sha.org/bottle/finishstyles.htm).	-		0.001
16.3	31NH895	2016 Lee Amateur Collection	5	Historic, Household	Glass, Common Glass	Bottle, Body Sherd	Olive	Mouth Blown, General		Possible mold seam visible in photo.	-		0.001
16.4	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Glass, Common Glass	Bottle, Body Sherd	Amber	Mold Blown, Mouth		Square/rectangular shaped bottle with at least one sunken panel.	-		0.001
16.5	31NH895	2016 Lee Amateur Collection	2	Historic, Household	Glass, Common Glass	Bottle, Base Sherd	Olive	Mouth Blown, General		Two vessels represented; two complete bases. One base has an obvious kick-up, other is hard to tell from photo. Possible wine bottles. *selection from the collection*	-		0.001
16.6	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Glass, Common Glass	Bottle, Base/Body Sherd	Aqua	Mold Blown, Mouth		Small, rectangular bottle with sunken panels.	-		0.001
16.7	31NH895	2016 Lee Amateur Collection	1	Historic, Tool	Metal, Iron	Axe Head, Almost Complete					-		0.001
16.8	31NH895	2016 Lee Amateur Collection	4	Historic, Architectural	Metal, Iron	Nail, Almost Complete		Square		Cannot identify manufacturing technique more specifically. *selection from the collection*	-		0.001
16.9	31NH895	2016 Lee Amateur Collection	1	Historic, Indeterminate	Metal, Iron	Indeterminate, Complete		Indeterminate		Unidentified iron ring. Approximately 4 in. diameter.	-		0.001
16.10	31NH895	2016 Lee Amateur Collection	1	Historic, Hardware	Metal, Iron	Bolt, Almost Complete	Earth Tone Colors	Indeterminate		Bolt portion of nut/bolt.	-		0.001
16.11	31NH895	2016 Lee Amateur Collection	1	Historic, Architectural	Metal, Iron	Spike, Railroad, Almost Complete		Indeterminate		Possible railroad spike.	-		0.001
16.12	31NH895	2016 Lee Amateur Collection	1	Historic, Hardware	Metal, Iron	Hinge, Almost Complete		Indeterminate			-		0.001
16.13	31NH895	2016 Lee Amateur Collection	1	Historic, Hardware	Metal, Iron	Hook, Complete		Indeterminate		"S" hook.	-		0.001
16.14	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Ceramic, Stoneware	Hollowware, Body Sherd	Gray	Salt Glazed, Gray/Buff Bodied		Gray salt glazed exterior; possibly unglazed interior.	-		0.001
16.15	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Ceramic, Stoneware	Hollowware, Body Sherd	Buff	Salt Glazed, Gray/Buff Bodied		Brown salt glazed exterior; unglazed interior. Likely a stoneware bottle.	-		0.001
16.16	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Ceramic, Stoneware	Hollowware, Body Sherd		Slip Glazed Stoneware	Bristol-Type Slip- - White	Sherd Bristol slip as well as a light brown slip or glaze (not Albany slip). Partial shoulder visible; likely a stoneware bottle.	1880-1960	Cheek 2016	0.001

FS.Entry#	Site#	Provenience	Artifact Count	Group	Material	Object	Color	Ware/ Technology/ Species	Decoration	Comments	Date	Reference	Weight (grams)
16.17	31NH895	2016 Lee Amateur Collection	2	Historic, Household	Ceramic, Stoneware	Hollowware, Body Sherd	Buff	Salt Glazed, Gray/Buff Bodied		Brown salt glazed exterior, light brown wash on interior. Possibly bottle sherds.	-		0.001
16.18	31NH895	2016 Lee Amateur Collection	2	Historic, Household	Ceramic, Refined Earthenware	Hollowware, Base/Body/Rim Sherd		Yellowware	Molded Pattern- Paneled- - Indeterminate	Yellowware hollowware, possibly a bowl. Paneled body with molded decoration under exterior rim.	1828-1940	www.jefpat.org	0.001
16.19	31NH895	2016 Lee Amateur Collection	5	Historic, Household	Ceramic, Refined Earthenware	Plate, Base/Body/Rim Sherd		White Granite	Indeterminate	At least three plates represented, one with molded decoration on the rim. One of the bases looks like it could be a hollowware base, rather than a plate. Two sherds look burned.	1840-1930	www.jefpat.org	0.001
16.20	31NH895	2016 Lee Amateur Collection	3	Historic, Household	Ceramic, Refined Earthenware	Plate, Rim Sherd		Whiteware	Molded Pattern- Painted- Blue- Shell Edge, Other	3 plates represented: 2 look like they are shell edge, unscalloped, with impressed repetitive designs, 1840-1870 (www.jefpat.org) & the third looks like it may be shell edge, unscalloped & unmolded, 1860-1900 (www.jefpat.org). One sherd looks burned.	-		0.001
16.21	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Ceramic, Refined Earthenware	Plate, Rim Sherd		Pearlware/Whiteware	Molded Pattern- Painted- Blue- Shell Edge, Even Scalloped, Curved Lines	Cannot determine if sherd is whiteware or pearlware.	1800-1840	www.jefpat.org	0.001
16.22	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Ceramic, Refined Earthenware	Plate, Base/Body/Rim Sherd		Pearlware	Molded Pattern- Painted- Blue- Shell Edge, Embossed Rim		1820-1835	www.jefpat.org	0.001
16.23	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Ceramic, Refined Earthenware	Plate, Base/Body Sherd		Whiteware	Printed- - Blue- Indeterminate	Not enough of decoration remains to identify pattern.	1815-1915	Azizi et al 1996	0.001
16.24	31NH895	2016 Lee Amateur Collection	1	Historic, Household	Ceramic, Refined Earthenware	Plate, Body Sherd		Pearlware	Printed- - Blue- Old Blue- General	Not enough of decoration remains to identify pattern more specifically.	1815-1840	Azizi et al 1996	0.001
16.25	31NH895	2016 Lee Amateur Collection	2	Historic, Household	Ceramic, Refined Earthenware	Plate, Body/Rim Sherd		Whiteware	Molded Pattern- Painted- Blue- Shell Edge, Even Scalloped, Curved Lines	Separate plates represented.	1800-1840	www.jefpat.org	0.001
16.26	31NH895	2016 Lee Amateur Collection	5	Unknown, Indeterminate	Unknown, Indeterminate	Indeterminate,				Unidentified objects, possibly building material. Three pieces look like possible mortar, one looks like possible rock (natural?).	-		0.001
16.27	31NH895	2016 Lee Amateur Collection	2	Historic, Indeterminate	Fauna, Leather	Indeterminate, Fragment				Possible shoe leather.	-		0.001
16.28	31NH895	2016 Lee Amateur Collection	2	Organic, Indeterminate	Fauna, Bone	Bone, Fragment		Unidentified Mammal		Unidentified mammal bone. Possible cut mark visible on one piece.	-		0.001

APPENDIX B

Dive Logs

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Bluffs	DCA Lucy	23 Mar 23	1
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
C. Marshall	A. Matthews	A. Parker

# of Dives in the Past 48 Hours:

Date	Depth	Length
1.		
2.		
3.		
4.		

Purpose of Dive:
Proficiency on circle searches. Testing full face masks/underwater comms/drysuits

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
15 ft	58	None	<1 ft	sand	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 1345	Time Out: 1411	Total Time: 26
Air In: 3200	Air Out: 2100	Total Air Used: 1100

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 15 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Work included divers testing drysuits and wireless communications while getting proficiency on performing circle searches. Work was accomplished

6. Notes and Observations

None

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Bluffs	DCA Lucy	23 Mar 23	1
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A, Matthews	C. Marshall	A. Parker
# of Dives in the Past 48 Hours:		
Date	Depth	Length
1.		
2.		
3.		
4.		

Purpose of Dive:
Proficiency on circle searches. Testing full face masks/underwater comms/drysuits

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
15 ft	58	None	<1 ft	sand	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other: reel
☐	☐	☐	☐	☐	☐	■	

4. Dive

Time In: 1345	**Time Out: 1411**	**Total Time: 26**
Air In: 3100	**Air Out: 2100**	**Total Air Used: 1000**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 15 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Work included divers testing drysuits and wireless communications while getting proficiency on performing circle searches. Work was accomplished

6. Notes and Observations

None

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.04	DCA Lucy	24 Mar 23	2
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A. Matthews	C. Marshall	J. Grinnan

Purpose of Dive:
Identify source of Target N.04

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 23 Mar 23	15 ft	26 minutes
2.		
3.		
4.		

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
35 ft	58	1 knot	<1 ft	silt	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 1235	**Time Out: 1315**	**Total Time: 40**
Air In: 3000	**Air Out: 750**	**Total Air Used: 2250**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 35 ft

One Hour Diver Checkback: Conducted checks at 15 minutes and 30 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.04. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

5' clear; 10'- 2' X 2' east of buoy; 15' clear lots of probes penetration mostly 4', a few 3' until sand bottom

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.04	DCA Lucy	24 Mar 23	2
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
C. Marshall	A. Matthews	J. Grinnan

Purpose of Dive:
Identify source of Target N.04

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 23 Mar 23	15 ft	26 minutes
2.		
3.		
4.		

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
35 ft	58	1 knot	<1 ft	silt	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other: reel
☐	☐	☐	☐	☐	☐	■	

4. Dive

Time In: 1235	**Time Out: 1315**	**Total Time: 40**
Air In: 2600	**Air Out: 500**	**Total Air Used: 2100**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 35 ft

One Hour Diver Checkback: Conducted checks at 15 minutes and 30 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.04. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

5' clear; 10'- 2' X 2' east of buoy; 15' clear lots of probes penetration mostly 4', a few 3' until sand bottom

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.01	DCA Lucy	25 Mar 23	1
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
J. Grinnan	A. Matthews	C. Marshall

Purpose of Dive:
Identify source of Target N.01

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1.		
2.		
3.		
4.		

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other: Bottom Type
40 ft	58	1 knot	<1 ft	Hard	Sandstone; no probing

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 0845	Time Out: 0915	Total Time: 30
Air In: 3000	Air Out: 1450	Total Air Used: 1550

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 40 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.01. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

hard bottom (no probing), grey sandstone, weathered in channel, 5' clear, 10’ had one hit, 15’ clear

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.01	DCA Lucy	25 Mar 23	3
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A. Matthews	J. Grinnan	C. Marshall

Purpose of Dive:
Identify source of Target N.01

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 23 Mar 23	15 ft	26 minutes
2. 24 Mar 23	35 ft	40 minutes
3.		
4.		

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other: Bottom Type
40 ft	58	1 knot	<1 ft	Hard	Sandstone; no probing

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other: reel
☐	☐	☐	☐	☐	☐	■	

4. Dive

Time In: 0845	Time Out: 0915	Total Time: 30
Air In: 3000	Air Out: 1700	Total Air Used: 1300

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 40 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.01. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

hard bottom (no probing), grey sandstone, weathered in channel, 5' clear, 10’ had one hit, 15’ clear

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.03	DCA Lucy	25 Mar 23	2
			SI: 36 minutes	

1. Dive Preparation

Diver	Tender/Buddy	Standby
J. Grinnan	A. Matthews	C. Marshall

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 25 Mar 23	40 ft	30 minutes
2.		
3.		
4.		

Purpose of Dive:
Identify source of Target N.03

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
30 ft	58	1 knot	<1 ft	mud	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 0951	Time Out: 1017	Total Time: 26
Air In: 3000	Air Out: 2000	Total Air Used: 1000

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 30 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.03. Complete circle searches out to 10 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

thick fluffy coastal mud, arm length deep, 5' circle and 10' circle. 3 large telephone poles that had metallic hits, small cable 2' long.

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.03	DCA Lucy	25 Mar 23	4
			SI: 36 minutes	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A. Matthews	J. Grinnan	C. Marshall

Purpose of Dive:
Identify source of Target N.03

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 23 Mar 23	15 ft	26 minutes
2. 24 Mar 23	35 ft	40 minutes
3. 25 Mar 23	40 ft	30 minutes
4.		

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
30 ft	58	1 knot	<1 ft	mud	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other: reel
☐	☐	☐	☐	☐	☐	■	

4. Dive

Time In: 0951	Time Out: 1017	Total Time: 26
Air In: 3000	**Air Out: 2000**	**Total Air Used: 1000**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 30 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.03. Complete circle searches out to 10 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

thick fluffy coastal mud, arm length deep, 5' circle and 10' circle. 3 large telephone poles that had metallic hits, small cable 2' long.

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.02	DCA Lucy	25 Mar 23	3
			SI: 24 minutes	

1. Dive Preparation

Diver	Tender/Buddy	Standby
J. Grinnan	A. Matthews	C. Marshall

Purpose of Dive:
Identify source of Target N.02

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 25 Mar 23	40 ft	30 minutes
2. 25 Mar 23	30 ft	26 minutes
3.		
4.		

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
37 ft	59	1 knot	<1 ft	mud	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 1041	**Time Out: 1101**	**Total Time: 20**
Air In: 2000	**Air Out: 1150**	**Total Air Used: 850**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 37 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.02. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

thick fluffy coastal mud, arm length deep, 5' circle, 10' circle, 15' circle; at 10' circle large chicken wire box 4' X 4'.

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target N.02	DCA Lucy	25 Mar 23	5
			SI: 24 minutes	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A. Matthews	J. Grinnan	C. Marshall

Purpose of Dive:
Identify source of Target N.02

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 23 Mar 23	15 ft	26 minutes
2. 24 Mar 23	35 ft	40 minutes
3. 25 Mar 23	40 ft	30 minutes
4. 25 Mar 23	30 ft	26 minutes

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
37 ft	59	1 knot	<1 ft	mud	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other: reel
☐	☐	☐	☐	☐	☐	■	

4. Dive

Time In: 1041	Time Out: 1101	Total Time: 20
Air In: 2000	**Air Out: 1000**	**Total Air Used: 1000**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 37 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target N.02. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

thick fluffy coastal mud, arm length deep, 5' circle, 10' circle, 15' circle; at 10' circle large chicken wire box 4' X 4'.

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target S.03	DCA Lucy	25 Mar 23	3
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
C. Marshall	A. Parker	A. Matthews

Purpose of Dive:
Identify source of Target S.03

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■
EANx ☐ _____ **%O_2**
Pressure Group:

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 23 Mar 23	15 ft	30 minutes
2. 24 Mar 23	35 ft	40 minutes
3.		
4.		

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
23 ft	62	1 knot	1 ft	sand	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 1428	**Time Out: 1455**	**Total Time: 27**
Air In: 3000	**Air Out: 1400**	**Total Air Used: 1600**
Bailout Pressure In: N/A		
Maximum Water Depth on Dive: 23 ft		
One Hour Diver Checkback: Conducted checks at 15 minutes and 20 minutes		

5. Work Scheduled and Accomplished

Identify source for Target S.03. Complete circle searches out to 20 ft at 10 ft intervals. All work completed and likely source identified.

6. Notes and Observations

10' and 20' circle, Sandy bottom; rock debris, tree/small branches, other vegetation, pipe 4" X 3', pipe flange, small round piling, and other small metallic hits.

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target S.03	DCA Lucy	25 Mar 23	1
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A. Parker	C. Marshall	A. Matthews

# of Dives in the Past 48 Hours:

Date	Depth	Length
1.		
2.		
3.		
4.		

Purpose of Dive:
Identify source of Target S.03

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
23 ft	62	1 knot	1 ft	sand	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other: reel
☐	☐	☐	☐	☐	☐	■	

4. Dive

Time In: 1428	**Time Out: 1455**	**Total Time: 27**
Air In: 3000	**Air Out: 1500**	**Total Air Used: 1500**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 23 ft

One Hour Diver Checkback: Conducted checks at 15 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target S.03. Complete circle searches out to 20 ft at 10 ft intervals. All work completed and likely source identified.

6. Notes and Observations

10' and 20' circle, Sandy bottom; rock debris, tree/small branches, other vegetation, pipe 4" X 3', pipe flange, small round piling, and other small metallic hits.

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target S.02	DCA Lucy	26 Mar 23	4
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
C. Marshall	A. Matthews	A. Parker

Purpose of Dive:
Identify source of Target S.02

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 24 Mar 23	35 ft	40 minutes
2. 25 Mar 23	23 ft	27 minutes
3.		
4.		

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
35 ft	62	1 knot	1 ft	Silty sand	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 0954	**Time Out: 1022**	**Total Time: 28**
Air In: 3100	**Air Out: 1500**	**Total Air Used: 1600**

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 35 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target S.02. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

5' clear tree stump; 10' 2 X 4" wood with multiple nails, 15' clear; light silty sand on the top (4-6") then hard pack sand, minimal penetration on probes

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target S.02	DCA Lucy	26 Mar 23	6
			SI: N/A	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A. Matthews	C. Marshall	A. Parker

Purpose of Dive:
Identify source of Target S.02

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 24 Mar 23	35 ft	40 minutes
2. 25 Mar 23	40 ft	30 minutes
3. 25 Mar 23	30 ft	26 minutes
4. 25 Mar 23	37 ft	20 minutes

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
35 ft	62	1 knot	1 ft	Silty sand	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other: reel
☐	☐	☐	☐	☐	☐	■	

4. Dive

Time In: 0954	Time Out: 1022	Total Time: 28
Air In: 3000	Air Out: 2000	Total Air Used: 1000

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 35 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target S.02. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

5' clear tree stump; 10' 2 X 4" wood with multiple nails, 15' clear; light silty sand on the top (4-6") then hard pack sand, minimal penetration on probes

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target S.01	DCA Lucy	26 Mar 23	5
			SI: 18 minutes	

1. Dive Preparation

Diver	Tender/Buddy	Standby
C. Marshall	A. Matthews	A. Parker
# of Dives in the Past 48 Hours:		
Date	**Depth**	**Length**
1. 24 Mar 23	35 ft	40 minutes
2. 25 Mar 23	23 ft	27 minutes
3. 26 Mar 23	35 ft	28 minutes
4.		

Purpose of Dive:
Identify source of Target S.01

Breathing Air Source:
SSA ☐ **Scuba** ■

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
32 ft	62	1 knot	1 ft	Silty sand	

3. Equipment

Hydro Probe	Dredge	Hand Held Probe	Hand Held Mag	Metal Detector	Camera	Video	Other:
☐	☐	■	☐	■	☐	☐	

4. Dive

Time In: 1040	**Time Out: 1110**	**Total Time: 30**
Air In: 3100	**Air Out: 1600**	**Total Air Used: 1400**
Bailout Pressure In: N/A		
Maximum Water Depth on Dive: 32 ft		
One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes		

5. Work Scheduled and Accomplished

Identify source for Target S.01. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

5' small detector hit and wood debris; 10' clear; 15' clear; light silty sand on the top (4-6") then hard pack sand, minimal penetration on probes

Diving Supervisor:	Timekeeper:

AECOM
Dive Log

Project/District	Location/Site	Vessel	Date	Dive #
Wilmington Rail Realignment	Target S.01	DCA Lucy	26 Mar 23	7
			SI: 18 minutes	

1. Dive Preparation

Diver	Tender/Buddy	Standby
A. Matthews	C. Marshall	A. Parker

Purpose of Dive:
Identify source of Target S.01

Breathing Air Source:
SSA ☐ **Scuba** ■

# of Dives in the Past 48 Hours:

Date	Depth	Length
1. 24 Mar 23	35 ft	40 minutes
2. 25 Mar 23	40 ft	30 minutes
3. 25 Mar 23	30 ft	26 minutes
4. 25 Mar 23	37 ft	20 minutes
5. 26 Mar 23	35 ft	28 minutes

Breathing Mixture:
AIR ■

EANx ☐ _____ **%O_2**

Pressure Group:

2. Diving Conditions

Water Depth	Water Temp.	Current	Visibility	Bottom Type	Other:
32 ft	62	1 knot	1 ft	Silty sand	

3. Equipment

Hydro Probe ☐ **Dredge** ☐ **Hand Held Probe** ☐ **Hand Held Mag** ☐ **Metal Detector** ☐ **Camera** ☐ **Video** ■ **Other: reel**

4. Dive

Time In: 1040	Time Out: 1110	Total Time: 30
Air In: 3000	Air Out: 1700	Total Air Used: 1300

Bailout Pressure In: N/A

Maximum Water Depth on Dive: 32 ft

One Hour Diver Checkback: Conducted checks at 10 minutes and 20 minutes

5. Work Scheduled and Accomplished

Identify source for Target S.01. Complete circle searches out to 15 ft at 5 ft intervals. All work completed and likely source identified.

6. Notes and Observations

5' small detector hit and wood debris; 10' clear; 15' clear; light silty sand on the top (4-6") then hard pack sand, minimal penetration on probes

Diving Supervisor:	Timekeeper:

APPENDIX B4: SECTION 106 ASSESSMENT OF EFFECTS FOR ARCHITECTURE/HISTORY HISTORIC PROPERTIES

Revised Wilmington Rail Realignment

Section 106 Assessment of Effects for Architecture/History Historic Properties

Prepared For:

Federal Railroad Administration and

the City of Wilmington

Prepared By:

AECOM

June 2023

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1. INTRODUCTION

1.1 PROJECT SUMMARY

The City of Wilmington (City) in coordination with the Federal Railroad Administration (FRA) is completing the preliminary engineering and compliance with the National Environmental Policy Act (NEPA) for the proposed Wilmington Rail Realignment Project (Project). FRA is the lead federal agency. Funding for final design and construction have not been identified. The purpose of the Project is to improve safety, regional transportation mobility, and freight rail operations, while also improving resiliency from storms, regional travel reliability, and operational fluidity of the sole freight rail route connecting the Port of Wilmington (Port) and southeastern North Carolina with the national freight rail network.

Freight Rail traffic between the Port and Davis Yard in the Town of Navassa currently travels through the City, along the existing Transportation Inc (CSX) line, commonly referred to as the "Beltline." [1] This freight rail line was historically part of the Seaboard Air Line Railway/Atlantic Coast Railroad. The Preferred Alternative for the Project constructs a new rail bypass west of the City that provides for a more direct connection between the Port and Davis Yard (See Section 2.0). While almost all freight rail traffic would use the newly constructed bypass, the Project does not preclude freight rail operations on the Beltline. The utility of the Beltline will remain and could continue to serve shippers as needed.

Since FRA provided funding for preliminary engineering and NEPA, FRA has overseen the Section 106 process so that if FRA funding is acquired through a future grant, the Project can be efficiently completed. If FRA funding is acquired in the future, FRA will reinitiate the Section 106 review including consultation with consulting parties to review plan development and to confirm or revise its finding. However, if FRA funding is not used for the final design and construction, FRA would not be the lead Federal agency and would have no further obligations under Section 106.

1.2 SUMMARY OF REPORT

This Section 106 Assessment of Effects Report (Report) includes:

- Description of the alternatives analyses undertaken to identify a Preferred Alternative under NEPA;
- Summary of Section 106 consultation activities to date;
- Identification of the Area of Potential Effects (APE) based on the Preferred Alternative;

[1] The freight rail line has two different shorthand designations in this report. One, called the "Beltline," refers to the entire line from Davis Yard to the Port. The other, called the "Beltline District," refers to the NRHP-eligible portion of the freight line, which terminates east of S. Front Street near the southern end of the Preferred Alternative.

- Summary of Section 106 architecture/history identification efforts and a list of architecture/history historic properties in the APE (assessment of effects to archaeological historic properties will be completed in a separate report);
- Summary of the methodology used for assessing effects to architecture/history historic properties; and
- Assessments of effects for architecture/history historic properties.

The FRA determined in an April 1, 2022, letter, and the North Carolina State Historic Preservation Office (NCHPO) concurred on May 5, 2022, that five architecture/history historic properties are located within the APE: the NRHP-listed Wilmington Historic District; the NRHP-listed USS North Carolina Battleship Memorial Site (Battleship), which is also a National Historic Landmark (NHL); the Seaboard Air Line Railway/Atlantic Coast Railroad District (Beltline District), which is assumed eligible for the purposes of this Project; the NRHP-eligible Holy Church of Jesus Christ; and the NRHP-eligible Cape Fear Memorial Bridge (Memorial Bridge).

2. PROJECT DESCRIPTION

2.1 PROJECT BACKGROUND

The City received a grant from FRA under the Consolidated Rail Infrastructure and Safety Improvements (CRISI) program to complete preliminary engineering and environmental studies to determine how to improve safety, regional transportation mobility, and freight rail operations in Wilmington, while also improving system resiliency from storms, regional travel reliability, and operational fluidity of the sole freight rail route connecting the Port and southeastern North Carolina with the national freight rail network.

Existing freight operations along the Beltline varies from day-to-day depending on shipper demand and resource planning. Most CSX trains interchanging with the Wilmington Terminal Railroad (WTRY) at the Port facilities travel over the entirety of the Beltline, while other CSX and WTRY trains only move over portions of the Beltline in performance of local switching operations for the existing shippers. Currently, the freight trains that travel on the Beltline encounter 32 at-grade crossing along approximately eight miles through the City, since the Beltline forms a "V" through the City connecting the Port to Davis Yard via the Hilton Bridge across the Northeast Cape Fear River. The at-grade crossings from so many trains causes traffic delays, presents a safety risk, and reduces the quality of life for the 50,000 residents proximate to the Beltline, mainly minorities and lower economic individuals. The existing transportation network is shown on Figure 1.

A NEPA Study Area was established to inform the selection of a Preferred Alternative that best meets the Project's purpose and needs while minimizing social, environmental, and economic impacts. The NEPA Study Area encompasses approximately a one-mile area centered on the Beltline from east of Navassa to the Port through the City in New Hanover County, as well as undeveloped areas on Eagles Island and areas west of US 421 in Brunswick County (Figure 2). Land uses include mixed use and residential areas near downtown Wilmington (the central business district is outside the area) and single-family residential, business, and commercial resources throughout the remainder of the NEPA Study Area in New Hanover County. In Brunswick County, the NEPA Study Area is relatively undeveloped or includes industrial and/or commercial development along the Cape Fear River and US 421. Eagles Island, between the Cape Fear and Brunswick Rivers, is part dredge spoil and part pristine tracts of wetlands.

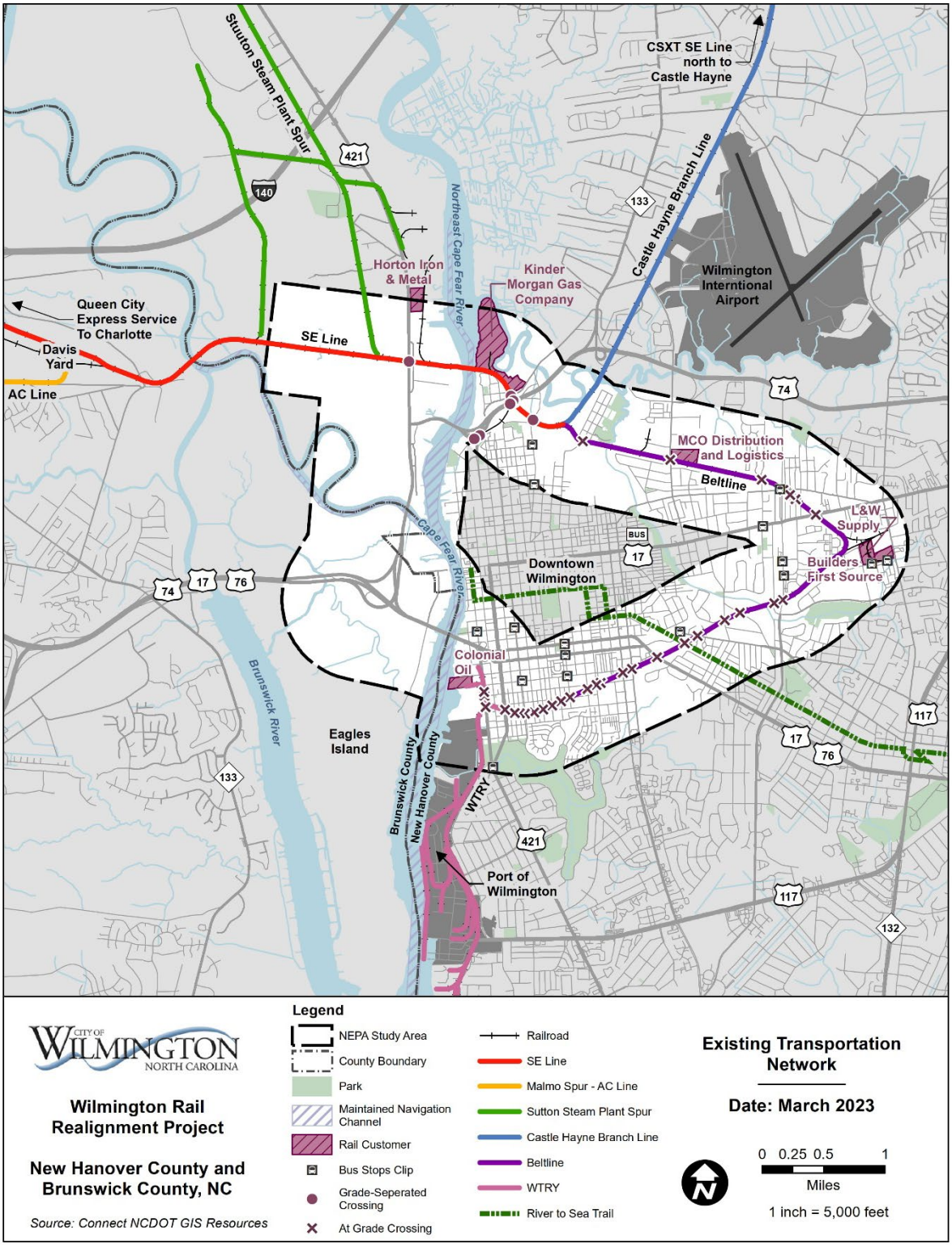

Figure 1: Existing Transportation Network

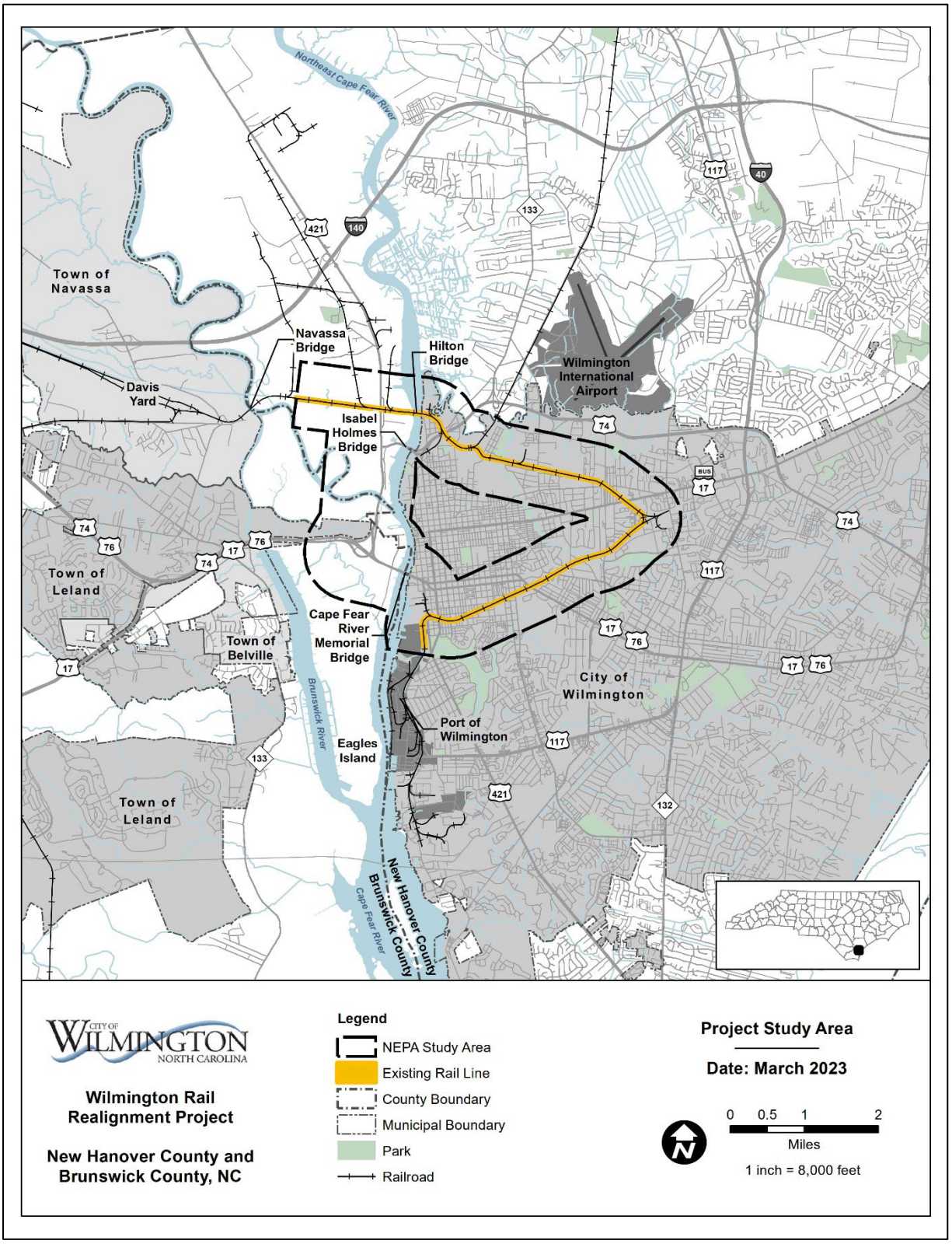

Figure 2: Project Study Area

2.2 ALTERNATIVES CONSIDERED UNDER NEPA

A multi-step process was used to identify a Preferred Alternative under NEPA. The 2017 *Wilmington Rail Realignment and Right of Way Use Alternatives Feasibility Study*[2] (Feasibility Study) served as the basis for alternatives development. A Corridor Screening Report[3] considered new or modified alternatives based on the Project's purpose and need, including engineering feasibility and environmental considerations at a qualitative level. The results of the Corridor Screening Report provided a vetted set of alternatives that were carried forward for more detailed study in the Alternatives Analysis Report[4]. The Alternatives Analysis Report provided a quantitative analysis of potential alternatives using an enhanced set of evaluation criteria and included a recommendation of a Preferred Alternative to be carried forward for further evaluation through the NEPA along with the No Build Alternative.

The Preferred Alternative (Alternative 2) went through several iterations of design refinements from the Feasibility Study to the Alternatives Analysis; however, it generally follows Corridor B from the Feasibility Study. During virtual meetings, drafts of both the Corridor Screening Report and the Alternatives Analysis Report were made available to the public for review and solicited comments. Preliminary results were also presented to the cooperating and participating agencies to incorporate their feedback and discuss public comments prior to finalizing the identification of the Preferred Alternative.

2.2.1 No-Build Alternative

Train frequencies traveling between the Port and Davis Yard would increase under the No- Build Alternative from the existing two trains per day to potentially six trains per day based on projected future freight volume. Under the No-Build Alternative, the increased train traffic would operate along the existing Beltline, including through the Wilmington Historic District. Under the No-Build Alternative, no new bypass would be constructed; however, there are several planned and programmed projects included in the No Build that establish a baseline for assessment, including the following:

- Wilmington Beltline Improvement Project (NCDOT STIP Project P-5740) –This project includes the removal of three at-grade crossings as well as improvements to 23 other crossings on the Beltline. The project also contemplates tie and rail rehabilitation, curvature adjustments and other line of road improvements. Construction is currently scheduled to begin in fiscal year (FY) 2022.
- Independence Boulevard Extension Project (NCDOT STIP Project U-4434) – This project proposes an extension of Independence Boulevard within the NEPA Study Area. The current design for the Independence Boulevard Extension project assumes a grade separated crossing over the southern CSXT crossing and an elevated structure beginning at the Market Street interchange and continuing north of Hurst Street. This design was

[2] Moffatt & Nichol, 2017, "Wilmington Rail Realignment and Right of Way Use Alternatives Feasibility Study," June 2017.
[3] AECOM, 2021, "Wilmington Rail Realignment Corridor Screening Report," January 2021.
[4] AECOM, 2021, "Wilmington Rail Realignment Alternatives Analysis Report," November 2021.

proposed to eliminate the rollercoaster effect of the roadway due to the requirement from CSX that all road improvements over the railroad be grade separated and to minimize the barrier effect to communities. Construction is currently scheduled to begin in fiscal year (FY) 2022.

- South Front Street Widening project (NCDOT STIP Project U-5734) – This project proposes to widen US 421/Front Street from the Cape Fear Memorial Bridge to US 421/Carolina Beach Road and shift the current alignment of South Front Street. Construction is currently scheduled to begin in fiscal year (FY) 2022.

2.2.2 Preferred Alternative

The Preferred Alternative would reroute train traffic between the Port and Davis Yard from the Beltline to the proposed bypass freight rail line that crosses the Cape Fear River and traverses Eagles Island to reconnect with the existing CSX line to Davis Yard. While almost all freight traffic would be rerouted to the bypass, the Preferred Alternative does not preclude freight operations from occurring on the Beltline.

The Preferred Alternative begins at-grade by tying into existing trackage operated by the WTRY near Greenfield Street, then follows along the west side of S. Front Street. North of Wright Street, the Preferred Alternative travels northwest across Dawson Street and Surry Street and then crosses the Cape Fear River on a moveable span (vertical lift bridge) structure at a closed elevation of approximately 34 feet (top of rail). The partially open position of the vertical lift bridge will be 49 feet. The elevated structure continues approximately one mile before turning north and crossing over US 17 just west of the existing US 17/US 421/US 74/US 76 interchange at an approximate elevation of 41 feet (top of rail). After crossing the existing US 17/US 421/US 74/US 76 interchange, the alignment continues on elevated structure and gradually decreases in elevation and crosses the Cape Fear River again at approximately 21 feet in elevation utilizing a bascule type moveable span bridge. The Preferred Alternative continues north parallel to US 421/US 74 on embanked fill and ties into the existing CSX SE Line approximately 0.4 mile west of US 421/US 74. Approximately 50 percent of the alignment is proposed on structure. The Preferred Alternative is shown in Figure 3.

The bridge design received a Preliminary Navigational Clearance Determination from the US Coast Guard, which acknowledged a horizontal navigational clearance of 250 feet and a vertical clearance of 135 feet above mean high tide. The reduced horizontal clearance requirement will allow for the proposed bridge's vertical lift span towers to be inset from the Memorial Bridge's towers. Its scale will be comparable to that of the Memorial Bridge, but with a lower profile: its approaches and movable span will be about 40 feet above the river in the resting position, lower than the 65-foot height above the river of the Memorial Bridge's span in the resting position.

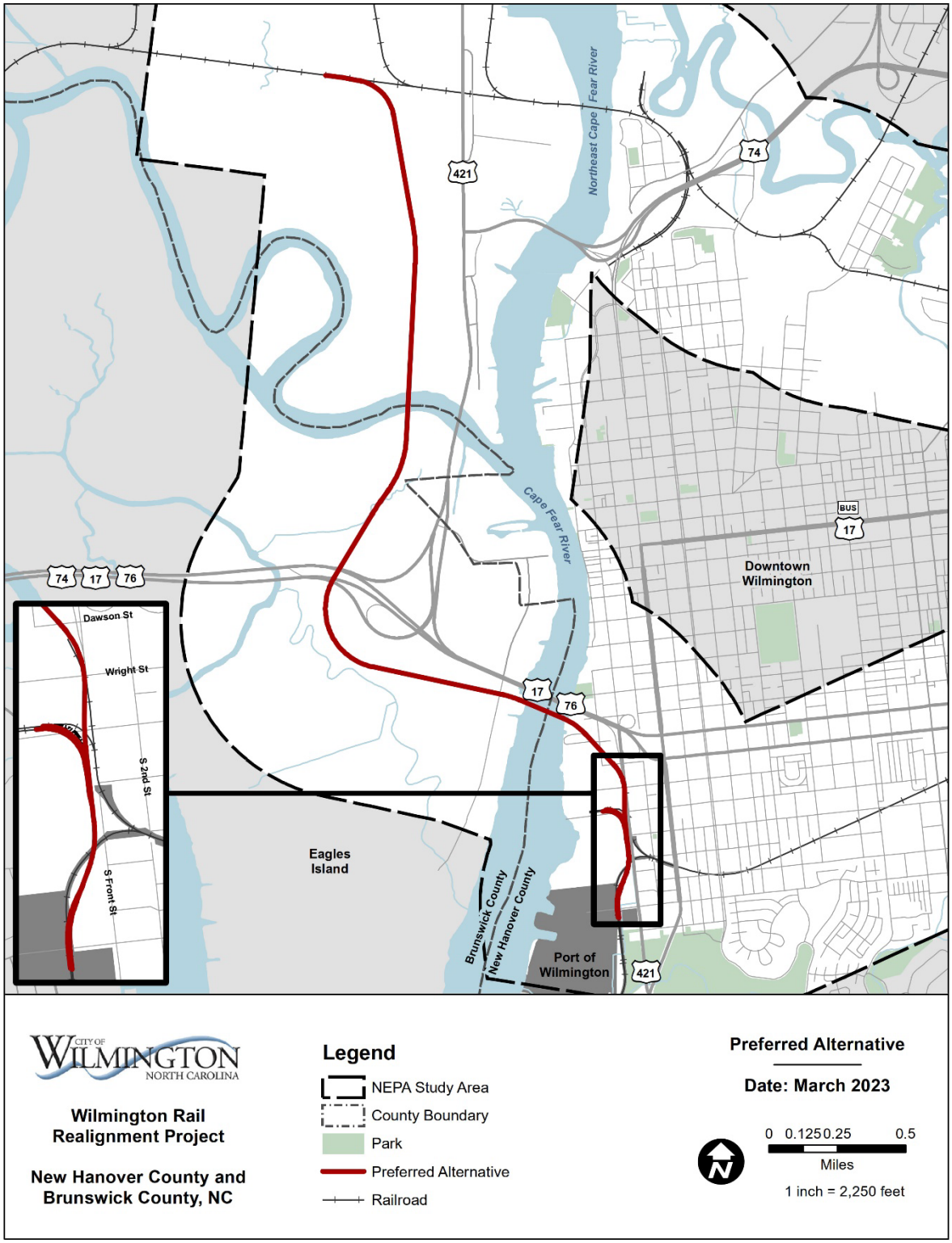

Figure 3: Preferred Alternative

3. SECTION 106 CONSULTATION

FRA initiated Section 106 consultation with the NCHPO and the North Carolina Office of State Archaeology (OSA) in a letter dated February 19, 2021. On February 22, 2021, FRA, in cooperation with the City, also invited the NCHPO and OSA to become Participating Agencies in the development of the EA under NEPA. FRA and the City subsequently worked with the NCHPO to identify Consulting Parties to the Section 106 consultation process: the City, the Historic Wilmington Foundation, the USS North Carolina Commission, the Surface Transportation Board/Office of Environmental Analysis (STB/OEA), the Eagles Island Coalition, the New Hanover County Soil and Water Conservation District, and the North Carolina Division of Water Resources.

FRA and the City jointly conducted three Section 106 Consulting Party meetings, the first on November 17, 2021 the second on February 23, 2022, and the third on April 20, 2023. The general content of those meetings is outlined in Table 1.

Table 1: Consulting Party Meetings for the Project

Date	Content
11/17/2021	Consulting Party Coordination Meeting #1: • Shared Project updates and requested feedback on historic property identification • Reviewed Section 106 process and next steps regarding cultural resources within the NEPA Study Area and APE
2/23/2022	Consulting Party Coordination Meeting #2: • Reviewed the Historic Architectural Intensive-Level Survey, the Phase I Archaeology Survey, and the Underwater Archaeology Survey • Discussed the assessment methodology to determine potential effects to historic properties within the APE, including the use of visual simulations
4/20/2023	Consulting Party Coordination Meeting #3: • Reviewed the findings of the Assessment of Effects for Architecture/History Historic Properties • Reviewed the findings of the diving investigations for the Underwater Archaeology Survey

The feedback received during and following those meetings informed the development of the APE, the identification and evaluation of historic properties, the methodology for assessing effects, and the assessment of effects on historic properties. The feedback at the first Consulting Party meeting included comments by the USS North Carolina Commission about the potential use of barges to minimize impacts to the Battleship, and an agreement to increase the size of the APE around the two towers of the proposed new rail bridge across the Cape Fear River south of the Memorial Bridge. The feedback at the second meeting included comments by the Historic Wilmington Foundation about the potential cumulative effects of the Proposed Alternative upon the Wilmington Historic District and potential future expansions. The use of visualizations to assist in evaluating effects was discussed. The NCHPO also stated that it considered the Memorial Bridge to be individually eligible for NRHP listing and agreed to provide documentation supporting this. In a follow-up letter of March 9, 2022, the Historic Wilmington Foundation requested that houses on one block of Meares Street be considered for inclusion in the Wilmington Historic District; noise and vibration effects upon the Bear-Sol Winery Building within the Wilmington Historic District be considered; and Greenfield Lake Park and Gardens be re-evaluated for NRHP eligibility. In a March 10, 2022, email to FRA, the NCHPO provided information on the significance and integrity of the Memorial Bridge.

3.1 TRIBAL COORDINATION

FRA contacted the following tribes in July 2021 to invite them to be a consulting party to the Section 106 process and to provide information regarding historic properties of religious or cultural significance to the tribe that may be present within the APE:

- Catawba Indian Nation
- Lumbee Tribe of North Carolina
- Tuscarora Nation
- Waccamaw-Siouan Indian Tribe

The Catawba Indian Nation was the only tribe to respond. They noted that they had no immediate concerns regarding traditional properties, sacred sites or Native American archaeological sites within the boundary of the APE. However, they request that they be notified if Native American artifacts and/or human remains are located during the ground disturbance phase of this project. They did not accept the invitation to be a consulting party.

4. IDENTIFICATION OF HISTORIC PROPERTIES

4.1 AREA OF POTENTIAL EFFECTS (APE)

The APE is the geographic boundary within which an undertaking (the Project) may directly or indirectly cause alterations in the character or use of historic properties. Alterations from an undertaking do not necessarily equate to an adverse effect. For example, the visibility of a new project element from a historic property may not result in adverse effects to its characteristics that qualify it for the National Register. The changes or alternations need to rise to the level meeting the criteria of adverse effects as defined in 36 CFR 800.5.

As per the Advisory Council on Historic Preservation, based on a Washington D.C. circuit court opinion issued in March 2019, "the meaning of the term 'directly' in Section 110(f) of the National Historic Preservation Act as referring to the causality, and not the physicality, of the effect to historic properties. This means that if the effect comes from the undertaking at the same time and place with no intervening cause, it is considered 'direct' regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.). 'Indirect' effects to historic properties are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable.

FRA initially established an APE that extended 0.25 miles on either side of the centerline of the Preferred Alternative. Based on feedback from NCHPO at the November 17, 2021, Consulting Parties meeting, FRA increased the APE to 0.5 miles to either side of the proposed bridge's centerline as well as a one-mile buffer around the towers of the proposed southerly crossing of the Cape Fear River to account for potential visual effects from the height of the proposed rail bridge (Figure 4).

4.2 IDENTIFICATION OF HISTORIC PROPERTIES

Section 106 regulations define a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in" the NRHP. FRA and the City, with the support of AECOM, identified architecture/history historic properties within the APE, in consultation with the NCHPO and the Consulting Parties. Two field surveys were conducted: an initial Reconnaissance-Level Historic Architectural Survey Report (Reconnaissance- Level Survey Report), which FRA submitted to the NCHPO for review on July 27, 2021; and the Intensive-Level Historic Architectural Survey Report (Intensive-Level Survey Report), which FRA submitted to the NCHPO on July 12, 2022.

The draft Intensive-Level Survey Report identified four architecture/history historic properties previously listed or determined eligible for listing in the NRHP within the APE and one property FRA determined was NRHP eligible. On May 5, 2022, the SHPO commented on and concurred with FRA's determinations. On July 8, 2022, FRA submitted a final Intensive-Level Survey Report that addressed the NCHPO's comments. In the accompanying transmittal letter, FRA wrote regarding the Memorial Bridge:

> "In FRA's April 1, 2022 letter to your office, we noted that "Due to its design, the FRA has determined that the Cape Fear Memorial Bridge is eligible for NRHP listing under Criterion C, for embodying the distinctive characteristics of a type of construction." As discussed with you following your May 5th letter, survey and eligibility assessment of this Bridge was not part of the agreed to scope for the Intensive Level Architectural Survey. For this reason, the Bridge is not included in the Report. This letter and our April 1, 2022 letter constitutes FRA's determination that the Bridge is eligible for the NRHP under Criterion C."

Also in that letter, FRA wrote regarding the Beltline District:

> "In a letter from FRA to your office dated November 17, 2020 for the Proposed Improvements to the CSX Railroad SE Line [the "Beltline"] Railroad and Crossings Project, FRA stated it considered the Beltline to be NRHP-eligible for the purposes of that project. In a December 15, 2020 letter to the FRA, your office concurred with the Beltline's eligibility. FRA will continue to treat this property as eligible for the purposes of the Wilmington Rail Relocation Project, however we ask that you please send us any information you have on why this property is eligible that will help inform our assessment of effect."[5]

On August 4, 2022, the NCHPO agreed by letter with the FRA's determinations of architecture/history historic properties (see Figure 4 and Table 2). In that letter it also provided information on the significance and eligibility of the Beltline District. This information was received after the submittal of the final Intensive-Level Report but is included in this report as part of the Beltline District's assessment of effects.

[5] The CSX Railroad SE Line Railroad and Crossings Project referred to in these 2020 letters was an FRA undertaking distinct from and not connected with the current Project.

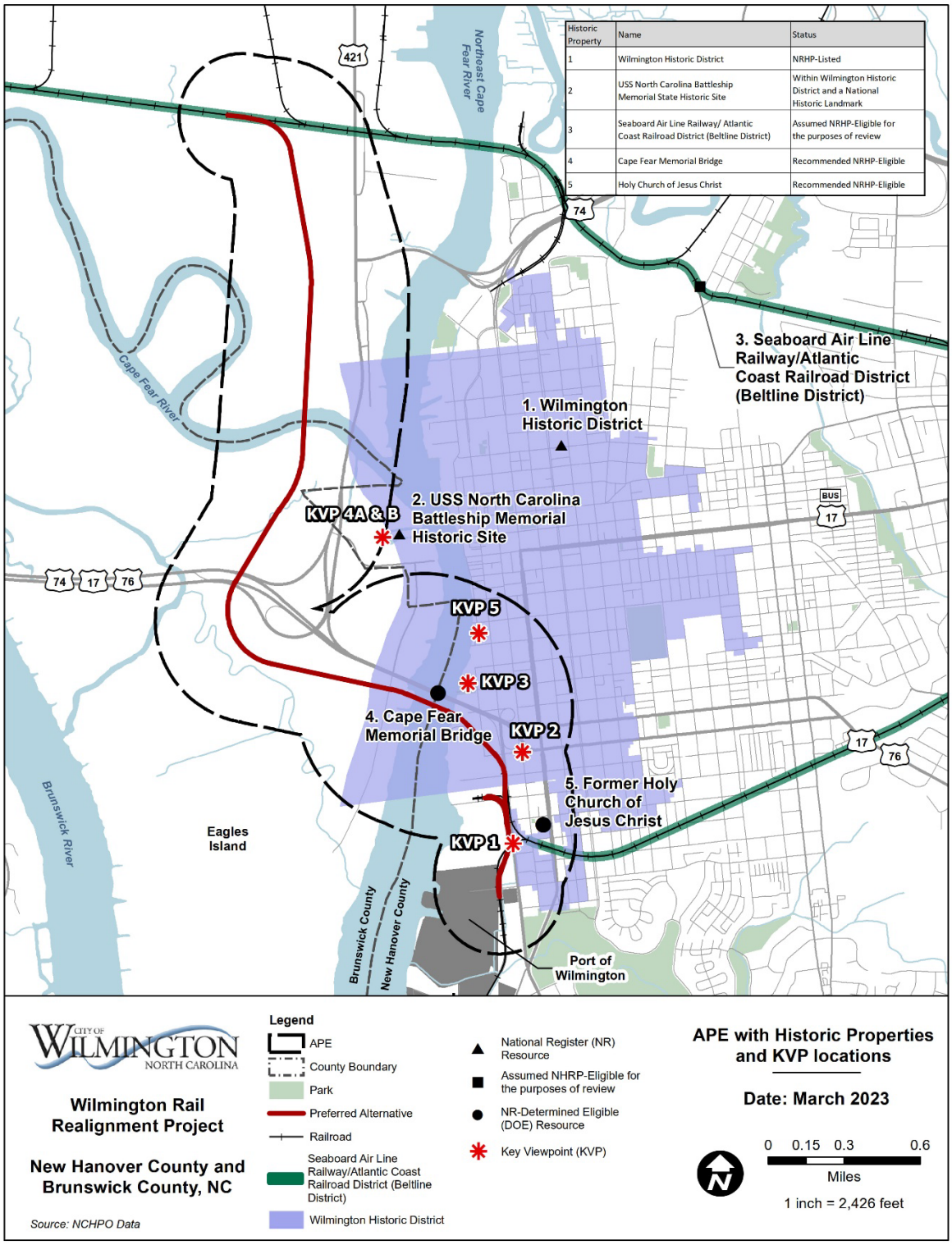

Figure 4: APE with historic properties and KVP locations

Table 2: Historic Properties Within the APE

Name (NCHPO Site Survey Number)	NRHP Listing or Determination of Eligibility (DOE) & Date	NRHP Criteria and Significance
Wilmington Historic District (NH0003 & NH2548)	NRHP—1974 & 2003	Criterion A for association with significant historical events; Criterion C for architecture
USS North Carolina Battleship Memorial Site (NH0004)	NRHP and NHL—1981	Criterion A for association with significant historical events; Criterion B for association with significant persons; Criterion C for design
Seaboard Air Line Railway/ Atlantic Coast Railroad District (Beltline District) (NH3674)	Assumed Eligible - 2020	Criterion A for association with significant historical events
Holy Church of Jesus Christ (NH3680)	DOE—2022	Criterion C/Criterion Consideration A for architecture
Cape Fear Memorial Bridge (NH2326)	DOE—2022	Criterion C for type of construction

5. ASSESSMENT OF EFFECTS METHODOLOGY

It is necessary to understand why a historic property was listed in or determined eligible for listing in the NRHP to assess a Project's effects to it. This section summarizes the significance and integrity requirements for a resource to be deemed a historic property, the Section 106 criteria of effects focusing on adverse effects, and the methodology used to assess the Project's effects on historic properties.

5.1 NRHP SIGNIFICANCE AND INTEGRITY REQUIREMENTS

Historic properties are buildings, sites, districts, objects, and structures listed in or determined eligible for listing in the NRHP by applying the NRHP Criteria for Evaluation (36 CFR Part 63). These criteria state:

> "The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
> B. that are associated with the lives of persons significant in our past; or
> C. that embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
> D. that have yielded, or may be likely to yield, information important in prehistory or history."

Built resources are typically eligible under Criteria A, B, and C, though occasionally they can meet the requirements of Criterion D if they can provide important information not available through other sources. Most archaeological sites are found eligible under Criterion D, though they are also sometimes eligible under Criterion A.

If a resource is determined to possess historic significance, its integrity is evaluated to determine if it conveys its historic significance, using the seven aspects of integrity. Crucial information on integrity assessments (used for eligibility determinations) regarding what each aspect of integrity entails and how each aspect relates to the select NRHP criteria for eligibility is included in NRHP guidelines. Retention of relevant aspects of integrity is critical to a property's significance under the NRHP criteria for evaluation. The NRHP Bulletin 15 "How to Apply the National Register Criteria for Evaluation" (Bulletin 15) identifies the aspects of integrity and describes their relevance to the NRHP criteria for evaluation. The seven aspects of integrity are described in the Bulletin in part as follows:

- "**Location** is the place where the historic property was constructed or the place where the historic event occurred. The relationship between the property and its location is often important to understanding why the property was created or why something happened. The actual location of a historic property, complemented by its setting, is particularly important in recapturing the sense of historic events and persons."
- "**Design** is the combination of elements that create the form, plan, space, structure, and style of a property. It results from conscious decisions made during the original conception and planning of a property (or its significant alteration) and applies to activities as diverse as community planning, engineering, architecture, and landscape architecture. Design includes such elements as organization of space, proportion, scale, technology, ornamentation, and materials."
- "**Setting** is the physical environment of a historic property. Whereas location refers to the specific place where a property was built or an event occurred, setting refers to the character of the place in which the property played its historical role. It involves how, not just where, the property is situated and its relationship to surrounding features and open space."
- "**Materials** are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. The choice and combination of materials reveal the preferences of those who created the property and indicate the availability of particular types of materials and technologies."
- "**Workmanship** is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. It is the evidence of artisans' labor and skill in constructing or altering a building, structure, object, or site. Workmanship can apply to the property as a whole or to its individual components. It can be expressed in vernacular methods of construction and plain finishes or in highly sophisticated configurations and ornamental detailing. It can be based on common traditions or innovative period techniques."
- **Feeling** is a property's expression of the aesthetic or historic sense of a particular period of time. It results from the presence of physical features that, taken together, convey the property's historic character. For example, a rural historic district retaining original design, materials, workmanship, and setting will relate the feeling of agricultural life in the 19th century."
- "**Association** is the direct link between an important historic event or person and a historic property. A property retains association if it is the place where the event or activity occurred and is sufficiently intact to convey that relationship to an observer. Like feeling, association requires the presence of physical features that convey a property's historic character."

As noted above, feeling and association require the presence of physical features that convey the historic property's historic character. Bulletin 15 concludes its summary of the seven aspects of integrity by stating: "Because feeling and association depend on individual perceptions, their retention *alone* is never sufficient to support eligibility of a property for the National Register."

According to guidance found in Bulletin 15, different aspects of integrity may be more or less relevant depending on why a specific historic property was listed in or determined eligible for listing in the NRHP. For example, a property that is significant for its historic association (Criteria A or B) is eligible if it retains the essential physical features that made up its character or appearance during the period of its association with the important event, historical pattern, or person(s). A property determined eligible under Criteria A or B ideally would retain some features of all aspects of integrity, although aspects such as design and workmanship might not be as important.

5.2 CRITERIA OF EFFECTS

An effect is defined as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR 800.16 (i)). Effects evaluations are based on a historic property's NRHP significance and integrity. If the Federal agency finds that there are no historic properties present or if there are but that the undertaking will have no effect upon them, then the agency will document a finding of no historic properties affected (36 CFR 800.4 (d) (1)). If there are historic properties present and the project has potential to affect them, the agency will evaluate to determine the type of effect—adverse or not. An agency finding of Adverse Effect or No Adverse Effect is based on the criteria of adverse effect as defined in 36 CFR 800.5.

> "An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

Examples of adverse effects included in 36 CFR 800.5 (2) include the following:

i. "Physical destruction of or damage to all or part of the property;
ii. Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines;
iii. Removal of the property from its historic location;
iv. Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
v. Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;

vi. Neglect of a property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization;

vii. Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance."

A project will have one finding of effect—if there are multiple historic properties but only one is adversely affected, the project receives a finding of Adverse Effect.

5.3 ASSESSMENT OF EFFECTS

FRA discussed the proposed methodology for assessing effects to historic properties at the February 23, 2022, consulting parties meeting. The meeting and follow-up comments raised concerns about potential cumulative, noise, and vibration effects, and the significance of the Memorial Bridge and Beltline District. As such, these resources were considered in the following effects assessments. However, FRA received no comments on the methodology for assessing effects on historic properties during or after the meeting.

5.3.1 Effects Not Anticipated from the Project

The following examples of adverse effects as per 36 CFR 800.5 are not relevant to the Project and are not discussed under each historic property in Section 6. Under the Project as currently proposed, no historic properties will be:

- Destroyed,
- Moved,
- Neglected,
- Repaired or rehabilitated, or
- Have a change of use.

While the Project construction, including the entirety of the bridge over the Cape Fear River, will occur within the boundaries of the Wilmington Historic District, the Project will not demolish, destroy, or move any contributing resources to the district. The Beltline District, Battleship, Holy Church of Jesus Christ, and the Memorial Bridge will not be demolished, destroyed, moved, or altered; therefore, these effects are not discussed under each historic property in Section 6.

There are no indirect (i.e., reasonably foreseeable but separated in time) and cumulative effects anticipated from the Project. The anticipated growth of the Port and other container sites is already occurring, which is leading to the proposal for the new route; therefore, the Project itself is not causing future expansion and growth of the Port and increased train traffic. Also, while most of the increased train traffic will utilize the new route, the historic Beltline District could continue to be used. No abandonment or discontinuance of the Beltline District is proposed as part of the Project or by CSX. Therefore, it is not reasonably foreseeable that the Project will change the character of the Beltline District's use that contributes to its historic

significance. Since the Project will not have indirect or cumulative effects to historic properties, these effects are not discussed under each historic property in Section 6.

5.3.2 Noise and Vibration

Potential noise and vibration effects to historic properties are based on the comprehensive Noise and Vibration Technical Memorandum (Technical Memorandum) prepared for the Project (Appendix A) in accordance with the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment Manual (Manual). The Manual is consistently used for FRA projects with conventional train speeds below 90 miles per hour. The Technical Memorandum describes the existing ambient noise and vibration conditions in the Project NEPA Study Area; identifies Project-related noise and vibration levels that will result from the No Build and the Preferred Alternative; discusses the temporary noise and vibration effects that could occur during construction; describes measures that have been incorporated into the design to reduce Project-related noise and vibration; and discusses potential noise and vibration minimization and mitigation measures.[6]

Twelve contributing elements to the Wilmington Historic District were identified as being impacted by increased noise (see Figure 5). Noise impacts are predicted at residential properties near the wye junction that abuts the future rail line due to the sounding of warning horns along South Front Street. Noise and vibration effects will only be discussed with regard to the Wilmington Historic District, as there are no other noise impacts to other resources.

5.3.3 Visual and Atmospheric

Potential visual and atmospheric effects from the Project include changing the physical features within the historic property's setting that contribute to its historic significance or the introduction of visual and atmospheric elements that diminish the integrity of the historic property's significant historic features. However, merely being able to see new Project elements from a historic property does not equal an adverse effect.

Multiple sources were consulted to determine the setting of each resource, both historically and when it was listed or determined eligible for the NRHP. These sources included NRHP and DOE documentation, as well as historic photographs, maps, and written descriptions, to help understand current and past integrity of setting, as well as feeling and association.

Key Viewpoints (KVP) visualizations were created to assist in visualizing the Project as it is proposed to be built based on preliminary engineering plans. The KVPs, which are subject to change during final design, include a current photograph with a visualization of the proposed construction superimposed upon it, along with annotations. The location of each KVP is depicted in Figure 4 and described in Table 3. The relevant KVPs are included with the individual historic property effects assessments in Section 6 along with current photographs looking from the resource toward the Project. The KVPs were shared and reviewed with the Consulting

[6] AECOM, 2023, "Wilmington Rail Realignment Noise and Vibration Technical Memorandum."[7] Wyatt, Sherry Joiner, and L. Robbie King, 2002, "Wilmington Historic District Boundary Expansion and Additional Documentation" NRHP nomination form.

Parties in a meeting on February 23, 2022, to determine whether these views were sufficient to assess the Project's visual effects to the historic properties. No comments on the visualizations were received during or after the meeting.

Table 3: KVP Visualizations

Number/View (Figure Number)	Location	Description
KVP 1/Proposed view (Figure 24)	Looking north up S. Front Street, from north of Greenfield Street near southern end of Wilmington Historic District	Looking north up S. Front Street from north of Greenfield Street with visualized proposed construction
KVP 2/Proposed view (Figure 22)	Looking northwest from S. Front Street ramp off of Memorial Bridge, within Wilmington Historic District, toward Front, at center, and Memorial Bridge towers beyond	Looking northwest from S. Front Street ramp off of Memorial Bridge with visualized proposed construction
KVP 3/Proposed view (Figure 20)	Looking west from end of Castle Street in Dram Tree Park toward Cape Fear River and Memorial Bridge, within Wilmington Historic District	Looking west from end of Castle Street in Dram Tree Park with visualized proposed construction
KVP 4[a]/ Proposed view (Figure 28)	Looking northwest from USS North Carolina conning tower toward bow, Eagles Island, and mainland	Looking northwest from USS North Carolina conning tower with visualized proposed construction
KVP 4[b]/ Proposed view (Figure 17)	Looking southeast across USS North Carolina port side deck toward Visitors Center and Cape Fear River	Looking southeast across USS North Carolina port side deck with visualized proposed construction
KVP 5/Proposed view (Figure 19)	Looking southwest along Cape Fear River and Wilmington Riverwalk, south of Ann Street, toward Memorial Bridge, within Wilmington Historic District	Looking southwest along Cape Fear River and Wilmington Riverwalk with visualized proposed construction

5.3.4 Potential Effects from the Project assessed in Section 6

Based on the studies and analysis summarized above, the only potential effects the Project may cause are limited to:

- Potential changes of physical features within the property's setting that contribute to its historic significance; and/or
- Introduction of visual, atmospheric, or audible (noise) elements that diminish the integrity of the property's significant historic features.

Each of these potential effects is discussed in Section 6 by historic property.

6. EFFECTS ASSESSMENTS OF HISTORIC PROPERTIES WITHIN APE

6.1 WILMINGTON HISTORIC DISTRICT

6.1.1 Description and Significance

The Wilmington Historic District (NH0003 and NH2548) was first listed in the NRHP in 1974. It encompassed 2,222 numbered resources, 1,751 of which were contributing. In 2003 the historic district was expanded to add 779 contributing and 255 noncontributing resources for a total of 2,530 contributing and 726 noncontributing. The historic district, with the acreage added by the expansion, encompasses approximately 2,000 acres (Figure 5).[7]

The original Wilmington Historic District NRHP nomination includes the following summary statement of significance:

> "Wilmington, long North Carolina's chief port, is the most distinctively urban of the state's towns; in a state historically rural, only Wilmington exhibits the character of a nineteenth century city. The grid of streets extending back from the waterfront is densely filled with commercial, governmental, ecclesiastical, and domestic buildings of consistent scale; the townscape is enhanced by the retention of early paving materials, large trees, and street furniture including ironwork and statuary. The architecture of nearly every period is characterized by a boldness and directness that place grand effect over precision of detail, seeming to express the energy and forcefulness of the merchants, shippers, and politicians of the bustling port city. There are [a] number of structures of outstanding merit, including works by Samuel Sloan and Thomas U. Walter, but the architectural fabric is dominated and unified by an apparently indigenous bracketed, vented Italianate idiom that was popular throughout much of the nineteenth century, especially during the antebellum boom period. As a major center of political, cultural, and commercial activity, and as the most significant concentration of urban architectural fabric, Wilmington is of prime importance to North Carolina. It is nationally significant as a major Southern port--the last remaining open to support the Confederacy--and a city where local efforts are actively preserving a townscape notable for its unique character and architectural distinction."[8]

[7] Wyatt, Sherry Joiner, and L. Robbie King, 2002, "Wilmington Historic District Boundary Expansion and Additional Documentation" NRHP nomination form.
[8] Survey and Planning Unit, 1974, "Wilmington Historic District" NRHP nomination form.

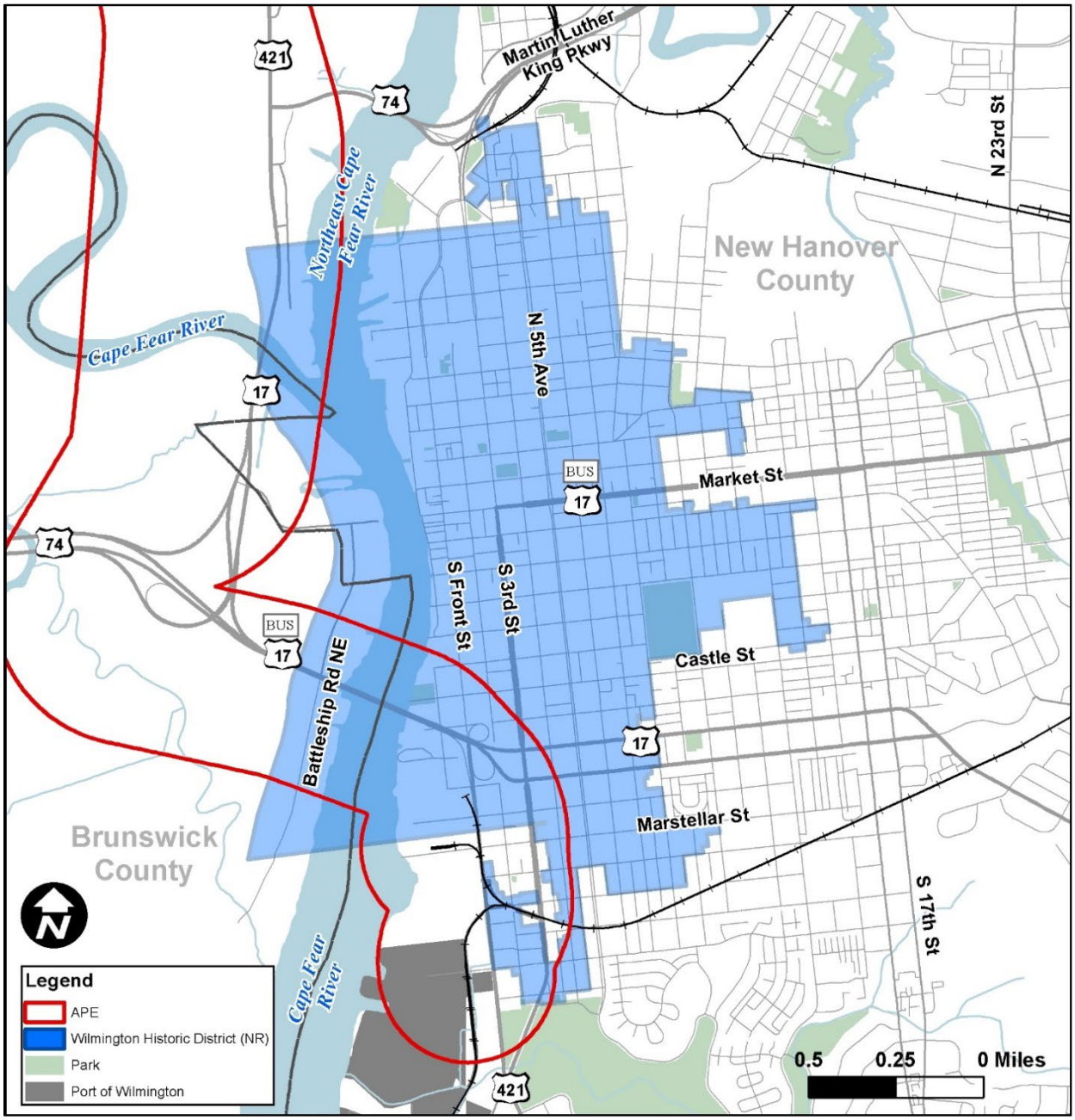

Figure 5: Wilmington Historic District NRHP Boundary Map

The nomination identifies the importance of domestic buildings within the historic district. These buildings encompass a variety of styles, including the Georgian, Federal, Greek Revival, Italianate, Craftsman, and Neo-Classical Revival. The commercial buildings concentrated on Market and Front streets are largely masonry, built in Italianate and Neo-Classical Revival styles. Less grand store buildings within residential neighborhoods are also often Italianate, but of frame construction.

According to the nomination, public buildings, including churches, "most frequently are the work of non-native professional architects and therefore are stylistically in step with national vogues--in contrast to the domestic architectural fabric of the town."[9] Most of these buildings are masonry. Their most commonly found styles are the Gothic Revival, Classical Revival, and Italianate.

In 2003 the "Wilmington Historic District Boundary Expansion and Additional Documentation" NRHP nomination form expanded the boundaries of, and number of resources within, the Wilmington Historic District. The expansion included an extension of the district's period of significance to 1945, with a few later dates specified for and limited to resources related to African American and educational history. The enlarged district brought in or expanded upon four areas of the city—Brooklyn, Hemenway, the Bottom, Dry Pond, and a discrete area referred to as South Eighth Street. The oldest sections of Dry Pond had already been included in the 1974 district.

The 2003 documentation characterizes the types of resources in the expansion area as follows:

> "The separate sections of the expansion area contain a mix of residential, commercial, institutional, and industrial resources. Single-family homes are the primary type of resource in the expansion area, establishing an overall residential character interspersed with commercial, institutional, and industrial resources that tended to serve the specific areas or neighborhoods that comprise the expansion area. All of the resources share a predominantly urban setting of houses and buildings set close to the street and to each other on narrow lots connected by sidewalks, grid-patterned streets, periodic fenced or hedged front yards, generally dense yard plantings, and intermittent, established canopies of street trees."[10]

It notes that most of the buildings are frame houses. Most are characterized by their form—front-gable; hall-and-parlor; pyramidal cottage; bungalow. The most common style is Craftsman. Non-residential buildings are identified as primarily residential-scaled stores. Industrial buildings, few in number, are generally large masonry warehouses.

[9] Ibid.
[10] Wyatt and King, 2003, "Wilmington Historic District Boundary Expansion and Additional Documentation" NRHP nomination form.

Portions of Dry Pond were specifically excluded from the expanded historic district boundaries due to lack of integrity. As detailed in the 2003 nomination update:

> "The Dry Pond neighborhood is the largest section of the expansion area and extends from the southern boundary of the existing historic district starting at Wright Street. The boundary is more irregular, owning [sic] to the *loss of integrity along South Second and Third streets, the presence of modern residential and commercial buildings*, and the inclusion of the impressive Bear-Sol Winery, 1100 block South Front Street (# 168); the Nesbitt Court Housing Project, 1400 block of South Third Street, (# 450); and, the South Fourth Street residential corridor. *The properties within these boundaries are the intact components of the residential, industrial, institutional, and commercial developments important to the history of Wilmington's working class.* In all, the expansion area is roughly bounded on the north by Wright and Meares streets via South Eighth Street; on the south by Willard and Kidder streets via Hooper Street; on the west by South Front Street; and on the east by South Fifth and Tenth streets via Kidder Street. The area extends south from Wright Street, between South Third and Eighth streets, for approximately three blocks before following a narrow course along both sides of South Fourth Street to its southern boundary along Willard Street. On the west, the boundary extends west along Greenfield Street to South Front Street to allow for the inclusion of the Southland Manufacturing Company, 1510 South Third Street (# 451), Nesbitt Court, and the Bear-Sol Winery. The area also extends east from its northeastern corner at South Eighth Street to include an approximately two-block area of residential development comprising the south side of Meares Street and the 1100 block of South Ninth Street [*emphasis added*]."[11]

In the 20 years since the Wilmington Historic District's boundary expansion, loss of integrity has continued along South Second and Third streets and elsewhere within the southern APE area, as detailed in the Reconnaissance and Intensive Survey Reports for this Project. Based on the survey work for the Project, new commercial and residential buildings are present and there are many vacant lots (see the narrative and photographs in the Intensive-Level Survey Report). Based on the survey work, the FRA determined, and the NCHPO concurred, that the boundaries of the historic district should not be expanded to include these areas and resources.[12] The southern APE area resources, unlike those within the historic district, do not

[11] Ibid.

[12] In a May 5, 2022, letter, the NCHPO concurred with the draft Intensive-Level Survey Report recommendations that the resources within a newly inventoried Wilmington Historic District—Potential Expansion Area (NH3681) were not eligible for NRHP listing. In that letter, the NCHPO also requested that more consideration be given to the Historic Wilmington Foundation's request to reconsider the potential NRHP eligibility of Greenfield Lake and Gardens (NH1381). In an August 4, 2022, letter following its review of the final Intensive-Level Survey Report, the NCHPO concurred with the FRA's finding that Greenfield

represent the "intact components of the residential, industrial, institutional, and commercial developments important to the history of Wilmington's working class." Therefore, this report assesses effects to the Wilmington Historic District as defined in the 2003 expansion.

The original 1974 nomination was prepared early in the NRHP program. As was common at that time, its period and areas of significance are broad ranging rather than tightly defined. The period of significance for the original nomination extends from the mid-eighteenth century through ca. 1945.[13] The nomination identifies the areas of significance as Architecture, Art, Commerce, Communications, Education, Engineering, Military, Political, Religion/Philosophy, Sculpture, Social/Humanitarian, Theater, Transportation, and Urban Planning.

The 2003 expansion identifies the Wilmington Historic District as significant under NRHP Criterion A, for its history, and Criterion C, for its architecture. Its period of significance has three dates or ranges, 1890-1945; 1953; and 1968-1971. The areas of significance are Commerce, Architecture, Community Planning and Development, Ethnic Heritage: African American, and Education. The dates of the Education period significance are called out as 1953 and 1968-1971.

6.1.2 Relationship of Project to the Wilmington Historic District

The proposed rail line from the Port north to across the Cape Fear River, including the proposed Cape Fear River bridge, are within the Wilmington Historic District boundaries (Figure 4).

6.1.3 Historic Railroad and Bridge Context

Since Wilmington's inception, the Cape Fear River has shaped the city's development. First crossed by boats and ferries, the river was spanned by its first bridge in 1869. Starting in 1840, the railroad molded the form and appearance of the city as well. The original Wilmington Historic District NRHP nomination identifies the Cape Fear River and the Beltline right-of-way as natural and manmade resources that contribute strongly to the setting of the historic district.[14] Of the Cape Fear, the nomination says"

> "Portion of river [is] within northern and southern boundary of the district. This wide, navigable river has played a crucial role in the historical development of Wilmington and is one of the most important features within the district."[15]

Lake and Gardens—a sliver of which is within the Wilmington Historic District—was not eligible for NRHP listing.

[13] Some resources identified as dating from ca. 1945 are found to be noncontributing due to the date; others are identified as contributing in spite of the date. Resources dated 1946 and later are identified as noncontributing due to their age.

[14] It is important to remember, though, that the National Register excludes natural waterways as a site or contributing resource even when they served as determinants in the location of communities. While waterways can help shape community, Bulletin 15 states "the features most appropriate to document this significance are the properties built in association with the waterways."

[15] Survey and Planning Unit, 1974, "Wilmington Historic District" NRHP nomination form.

Of the Wilmington & Weldon Railroad (W&WR), later part of the Beltline, it adds:

> "Much of the right of way within the district is below street grade and traversed by bridges at many locations. Portions of the right of way may date from around 1840 when the Wilmington and Weldon line was completed; it was the longest railroad in the world at the time. Most of the right of way, however, likely dates from around 1900 when the Wilmington and Weldon was incorporated into the Atlantic Coast Line. The railroad, like the river, played an extremely important role in Wilmington's development."[16]

Prior to the end of the Civil War, the W&WR terminated within the Wilmington Historic District on the east bank of the river. The Wilmington & Manchester Railroad (W&MR), a branch of the W&WR, picked up all service on Eagles Island on the river's west bank.[17] Previously, ferries hauled goods across the Northeast Cape Fear and Cape Fear rivers including those carried by the railroads. Ferry service began around 1766, following the construction of a causeway across Eagles Island. The conveyances ranged from flat-bottomed boats to steam-powered vessels.[18] In 1869, the two rail lines erected an iron Bollman truss bridge across the Northeast Cape Fear at Hilton, about one-half-mile north of the upper edge of the Wilmington Historic District (Figure 6).[19] In ca.1888, the structure was replaced by a wrought-iron drawbridge. A decade later this crossing was in turn replaced by a through-Pratt truss bridge. A rolling-lift bascule bridge supplanted that structure in 1916. In 1971, a contract was awarded to construct the current bridge, also a rolling-lift bascule, at the Hilton site.[20] Another prominent crossing of the Cape Fear—the Memorial Bridge, addressed separately below—was erected within the bounds of the Wilmington historic district in the late 1960s (Figure 7).

[16] Ibid.
[17] Gilmer, Jeremy Francis, "Map Showing the Entrenchments Around Wilmington," 1863.
[18] Burke, James C., Ph.D. dissertation, *North Carolina's First Railroads, A Study in Historical Geography*, 2008; Jackson, *The Cape Fear,* 1996.
[19] [Wilmington] *Daily Journal*, March 29, 1867, "The New Iron Railway Bridges" ; *Wilmington Semi-Weekly Post*, June 17, 1869, "Hilton—The House of Harnett."; *Baltimore Sun*, August 30, 1869, "Important Railroad Bridge Completed in North Carolina"
[20] Jackson, Claude V., III, *The Cape Fear—Northeast Cape Fear Rivers Comprehensive Study: A Maritime History and Survey*, Volume I. North Carolina State Historic Preservation Office, 1996.

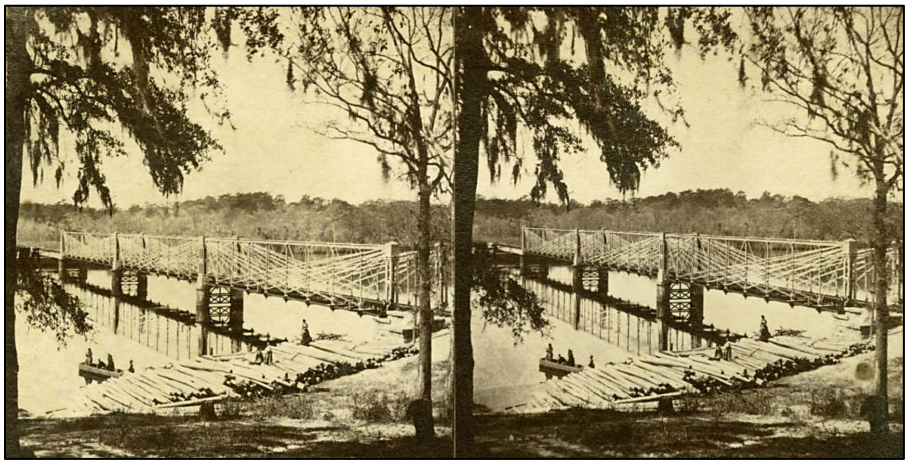

Figure 6: Stereographic image of Bollman truss bridge at Hilton, taken by Rufus Morgan in 1873 (source: Special Format Image 0218: Bridge at Hilton, 1873: Digital North Carolina Collection Photographic Archives (unc.edu))

Figure 7: View, looking northwest, of current early 1970s Hilton lift bridge, taken by LCP Media, June 2020 (source: Sawmill Point Apartments - Google Maps)

In 1889, the Cape Fear & Yadkin Valley Railway (CF&YVR) constructed wharves at Point Peter. The arrival of the new rail line at the confluence of the Cape Fear and Northeast Cape Fear rivers brought a flurry of activity. In 1890, the railroad completed the 82-mile extension of its line from Fayetteville to a terminus at the point opposite downtown Wilmington. The CF&YVR was short lived. In 1899, it was split and ACR acquired the section that ran to Point Peter and quickly routed its traffic over the Hilton bridge.[21] However, ferries continued to ply the river and ships of various sizes continued to carry cargo to and from the railroad (Figure 8 and Figure 9).

[21] Cape Fear and Yadkin Valley Railway Company, 1899.

Figure 8: Wilmington waterfront, ca. 1912 (source: The City of Wilmington, the metropolis and port of North Carolina - ECU Digital Collections)

Figure 9: Looking north up Front Street with Cape Fear River at left, trolley tracks at center, and US Federal Building and Customs House at right, 1920s (source: Waterfront - Cape Fear River - Wilmington. - Louis T. Moore Collection - New Hanover County Public Library Digital Archives (oclc.org)

A 1912 Wilmington Chamber of Commerce publication highlighted the centrality of rail lines to the life of the city:

> "Wilmington's facilities for reaching the markets of the country and abroad with her products, and for bringing raw materials and merchandise to her doors are particularly favorable. The city has unexcelled conveniences for shipping by railroad and also lines of steamboats connecting with New York and local points and direct steamship service to and from European countries. The two great competing railway systems, the Atlantic Coast Line and the Seaboard Air Line, through their thousands of miles of rail, and through the other lines with which they connect penetrate to every section and combined with the sea-going and

> coastwise facilities offer to the city direct and cheap connection with the whole continent and, indeed the world. Thus is brought here at economical competing rates, merchandise of every description and raw materials for manufacturing. Of the latter notably may be mentioned fertilizer ingredients. Hence is dispatched to countries abroad cotton, naval stores, lumber and other commodities.[22]"

Numerous twentieth-century maps and photographs show the prevalence of rail lines in Wilmington, particularly between Front Street and the Cape Fear River, within the Wilmington historic district (Figure 10 through Figure 12). They additionally depict trolleys running along and off Front and Market streets, within and beyond the historic district. These images clarify the intimate connection between the city, especially within the historic district, and rail lines.

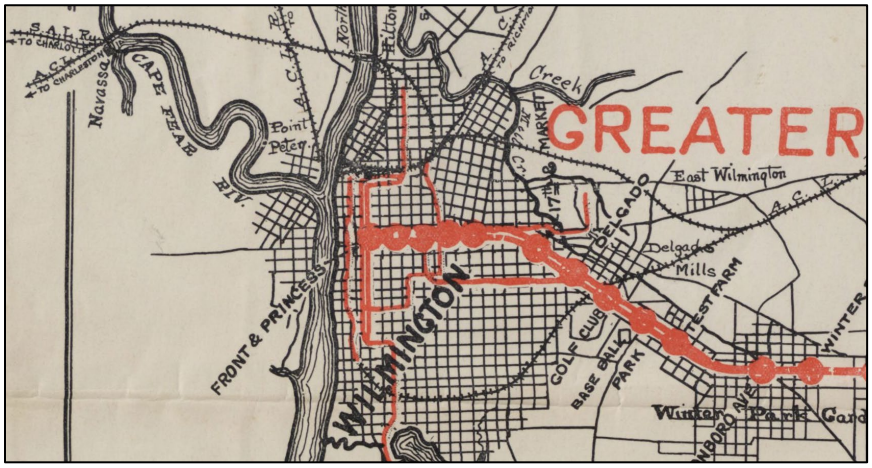

Figure 10: Ca. 1910 map with black cross-hatched rail lines and orange trolley routes (source: [Map showing suburban developments along the lines of the Tidewater Power Co. connecting Wilmington & Wrightsville Beach - ECU Digital Collections])

[22] Chamber of Commerce, 1912, "The City of Wilmington, the Metropolis and Port of North Carolina."

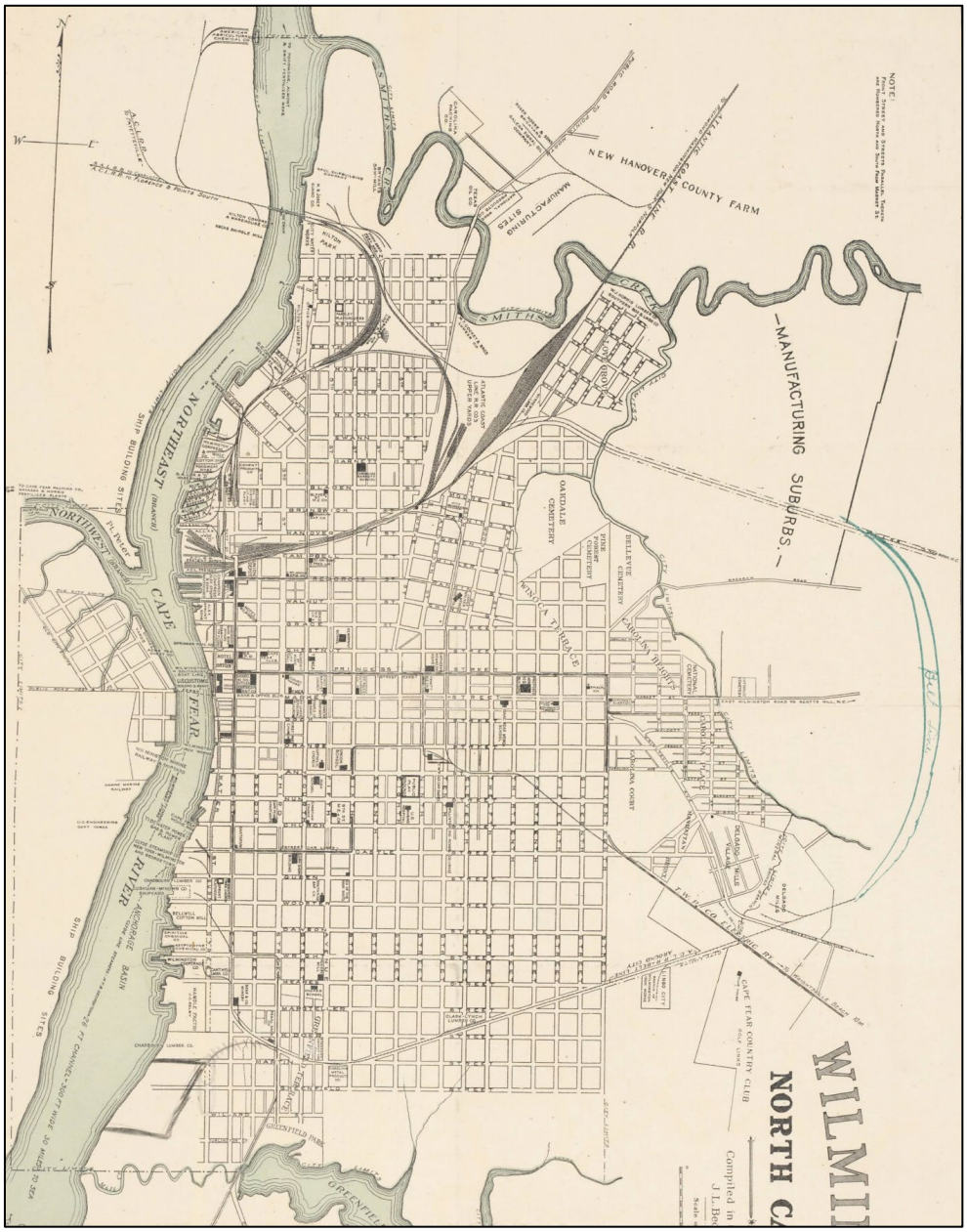

Figure 11: J.L. Becton's "Wilmington, North Carolina" map, ca. 1918—note extensive rail network, particularly at bottom (south) of map along S. Front Street (source: [Wilmington, North Carolina :: North Carolina Maps (unc.edu)])

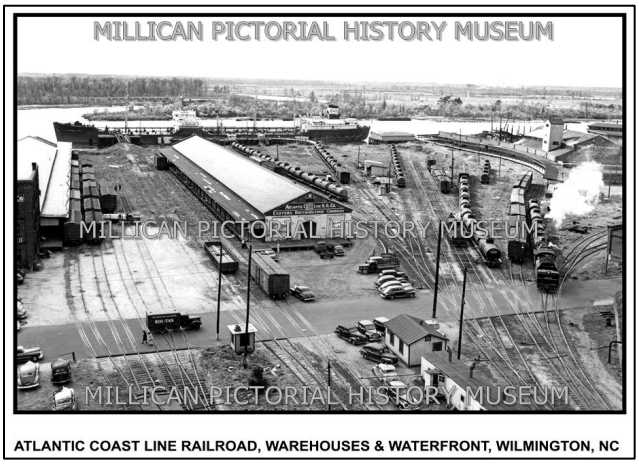

Figure 12: ACLR Warehouses, wharves, and Cape Fear River looking west, within Wilmington historic district, from near intersection of Nutt and Walnut streets, ca. 1940s (source: Atlantic Coast Line Railroad, Warehouses & Waterfront, Wilmington, NC – Millican Pictorial History Museum)

6.2 Assessment of Effects to the Wilmington Historic District

6.2.1 Noise and Vibration

Potential noise and vibration impacts resulting from operations and construction were evaluated for the Project. The analysis considered the existing and future conditions along the Beltline (No Build) as well as the Preferred Alternative. Future train volumes along the Beltline are predicted to increase from 1 roundtrip daily to up to 3 roundtrips daily. Due to the increase in train operations, receptor noise levels along the Beltline due to rail activity would reasonably be expected to increase as well particularly with the required sounding of onboard warning horns along most of the Beltline corridor. Because the Beltline traverses the Wilmington Historic District, it can be predicted that the Wilmington Historic District would experience an increase in noise by up to 10 percent due to the increase in operations, more frequent sounding of warning horns at the 32 at-grade crossings, and speed under the future No Build conditions.

For the Preferred Alternative, the increase in rail traffic would be rerouted to the new bypass. This would introduce noise impacts at residential properties near the wye junction that abuts the future rail line due to the sounding of warning horns along South Front Street. However, noise along the existing Beltline would be reduced by over 96 percent by rerouting the freight traffic. Under the Preferred Alternative, twelve out of the 2,530 contributing elements to the Wilmington Historic District were identified as being impacted by increased noise in the area along South Front Street (see Figure 5). Seven of those contributing elements are predicted to have a severe noise impact and four would have a moderate impact.

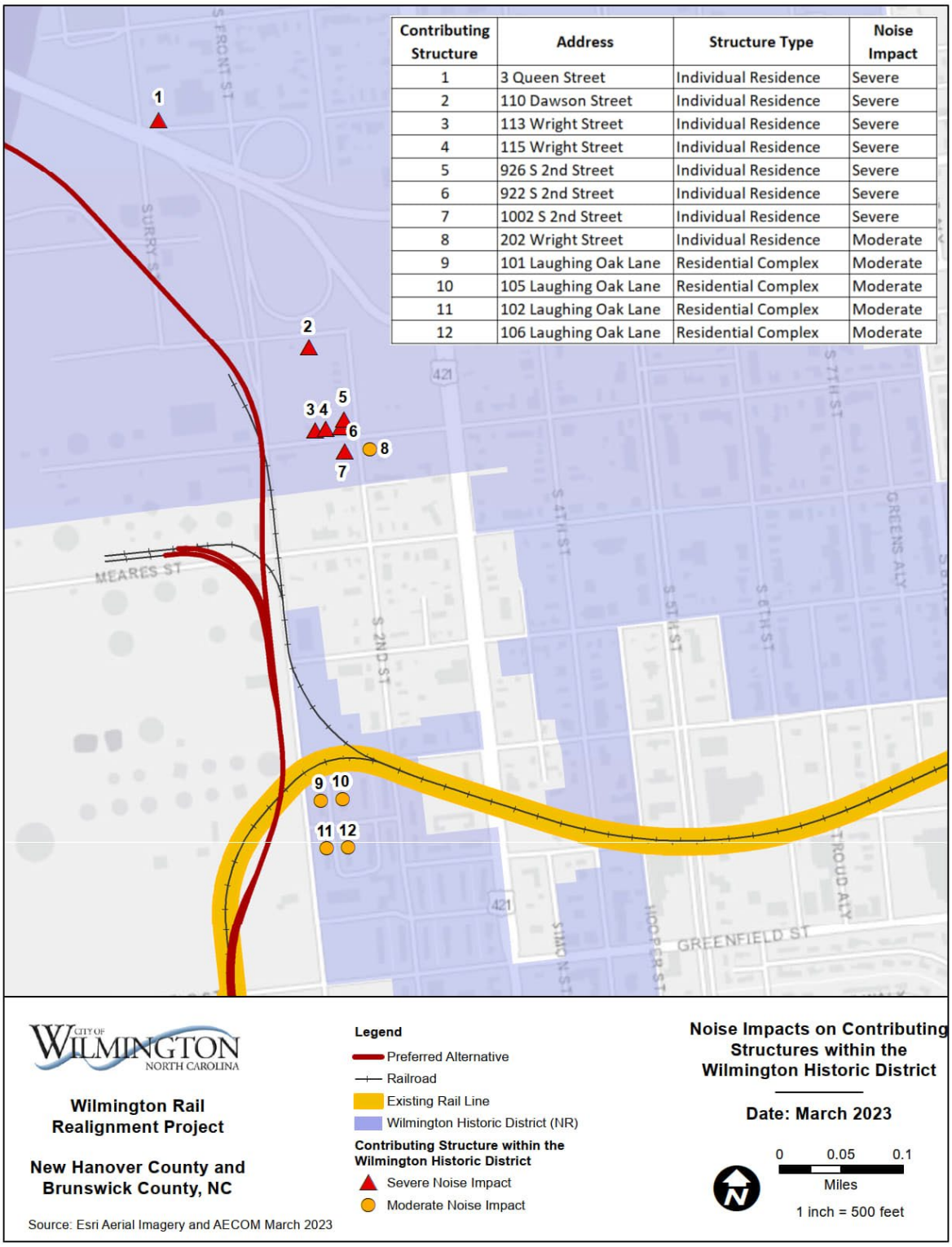

Figure 13: Inventory of Residences for Noise Levels within the Wilmington Historic District

Additionally, noise and vibration from impact devices such as pile drivers, needed for the constructure of bridge crossings, could also affect residences farther away along the current Beltline corridor; however, these impacts would be temporary, sporadic, and variable throughout the duration of the construction period. Construction activities are not predicted to exceed the FTA 'daytime' or 'nighttime' noise impact criteria at any of the contributing elements to the Wilmington Historic District.

Mitigation measures to reduce severe noise impacts associated with the sounding of warning horns along South Front Street are recommended. The City will commit to addressing severe noise impacts through appropriate noise mitigation. Noise mitigation measures may include street closures and reassigning public roadways to private driveways to eliminate the need for sounding warning horns and thereby eliminating the severe noise impacts. Such measures require City Council approvals that would be presented when appropriate. Additional mitigation measures may be considered as planning and design of the Project progresses.

Standard best management practices (BMPs) would be implemented to minimize noise and vibration effects during construction-related activities. All construction would generally occur during the daytime or evening periods to comply with local noise limits such as the "Code of Ordinances of the City of Wilmington, North Carolina," specifically Chapter 6, Article II, Section 6-26. Noise Control. These local ordinances restrict nighttime construction between midnight and 7:00 am.

6.2.2 Visual Effects

On the west side of the Cape Fear River and within the boundaries of the historic district, the proposed rail line will run north-south through heavily vegetated areas west of US 421 and then turn to run east-west to the south of the Memorial Bridge (Figure 4). There are no contributing resources to the historic district west of the Cape Fear River. The dense tree and ground vegetation growth, combined with distance to any contributing elements of the historic district, means that the proposed rail line on the west side of the Cape Fear River will not be visible (Figure 14).

Figure 14: July 2022 Google Maps photo northwest up Battleship Road at proposed rail line route running east-west across image below (south) of Memorial Bridge at top right

The proposed rail bridge will be located approximately 250 feet south of the existing Memorial Bridge. On the west side of the Cape Fear River and south of Memorial Bridge, the proposed rail bridge will only be visible from limited locations along Battleship Road NE. Since there are no contributing properties on the west side of the river that could be visually affected by the new Cape Fear Bridge, no KVP was developed but existing conditions are included in Figure 15.

Figure 15: Left, looking northeast, near southwestern edge of Wilmington Historic District, from river's edge near Battleship Road NE; right, looking northeast from Battleship Road NE at Memorial Bridge

Also on the west side of the Cape Fear River, the tops of the proposed bridge's towers will be barely visible from Battleship Park and the USS North Carolina (Figure 16 and Figure 17). Farther north, from the bank of the Northeast Cape Fear River within the historic district, it will not be visible due to landscape features, distance, and the presence of Memorial Bridge.

Figure 16: Left, looking southeast from Battleship Park east of USS North Carolina with Memorial Bridge towers visible at right distance; right, looking southeast from Battleship walkway with Memorial Bridge west tower visible near stern

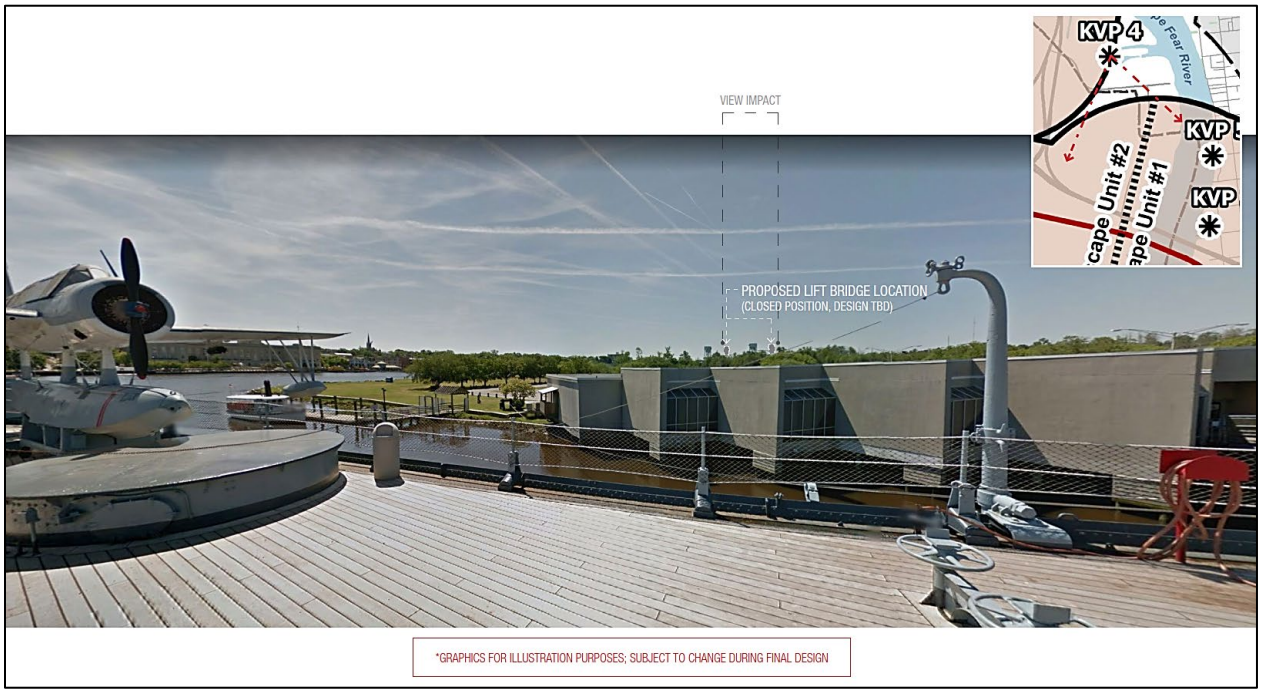

Figure 17: KVP 4[b] – Proposed view looking southeast across USS North Carolina port-side deck toward Visitors Center and Cape Fear River with addition of proposed rail bridge towers barely visible, along with Memorial Bridge towers, at center distance

Visual effects from the proposed railroad bridge to the historic district on the east side of the Cape Fear River are limited by the new bridge's placement and design. A Preliminary Navigational Clearance Determination from the US Coast Guard established a horizontal navigational clearance of 250 feet and a vertical clearance of 135 feet above mean high tide. The reduced horizontal clearance requirement allows for the proposed bridge's vertical lift span towers to be inset from the Memorial Bridge's towers making its massing and scale comparable to the Memorial Bridge but with a lower profile. Its approaches and movable span will be about 40 feet above the river in the resting position, lower than the 65-foot height above the river of the Memorial Bridge's span in the resting position. In all key viewpoints of the proposed bridge north of the Memorial Bridge from within the historic district, the Memorial Bridge minimizes views to the proposed bridge.[23]

The proposed Cape Fear River Bridge will only be visible from the waterfront and approach ramps to the Memorial Bridge from the east side of the river in the historic district. The built-up character of the historic district, the height of the buildings along Front Street, the presence of numerous mature shade trees, and the distance of the historic district's contributing resources from the bridge limits key views to the proposed bridge. In locations where it is visible, the

[23] The Cape Fear Memorial Bridge has been determined individually NRHP-eligible and is addressed at a separate entry below.

proposed bridge will be largely shielded from view and visually minimized by the extant bridge (Figure 18 through Figure 20).

Figure 18: Left, looking south toward Cape Fear Memorial Bridge from end of Dock Street and, right, looking south toward Bridge from end of Ann Street; the proposed rail bridge will be erected beyond (south of) Memorial Bridge

Figure 19: KVP 5 – Proposed view looking south along Cape Fear River and Wilmington Riverwalk, south of Ann Street with addition of proposed rail bridge behind (south) of Memorial Bridge and the proposed approaches delineated by thin black line

Figure 20: KVP 3 – Proposed view looking southwest within Wilmington Historic District from end of Castle Street in Dram Tree Park toward Cape Fear with addition of proposed tracks (yellow freight cars) at left (south), and proposed rail bridge left of Memorial Bridge

The proposed bridge and rail line will also be almost entirely hidden from view by the tank farms located between S. Front Street and the river near the waterfront on the east side of the Cape Fear River (Figure 21 and Figure 22).

Figure 21: Left, looking northwest from South Front and Marstellar streets with Memorial Bridge tower visible to left (west) of tank; right, looking northwest from South Front north of Wright Street with tower and part of Memorial Bridge lift span visible at right

Figure 22: KVP 2 – Proposed view looking northwest within Wilmington Historic District from Front Street off-ramp toward Front, crossing at center with the proposed rail line (yellow freight cars) at left (south) and towers of proposed rail bridge, at center distance, to the left of Memorial Bridge

On the east side of the Cape Fear River, the proposed rail line travels south from the proposed rail bridge to the Port west of S. Front Street (Figure 23 and Figure 24). The line will run immediately west of the existing Beltline route, which is non-contributing to the Beltline District in this section, to the Port.

Figure 23: Looking northwest from Meares and South Front streets just outside of historic district (rail line currently runs down the middle of South Front here); right, looking southeast from Surry Street north of Dawson Street at historic rail path that angles to South Front

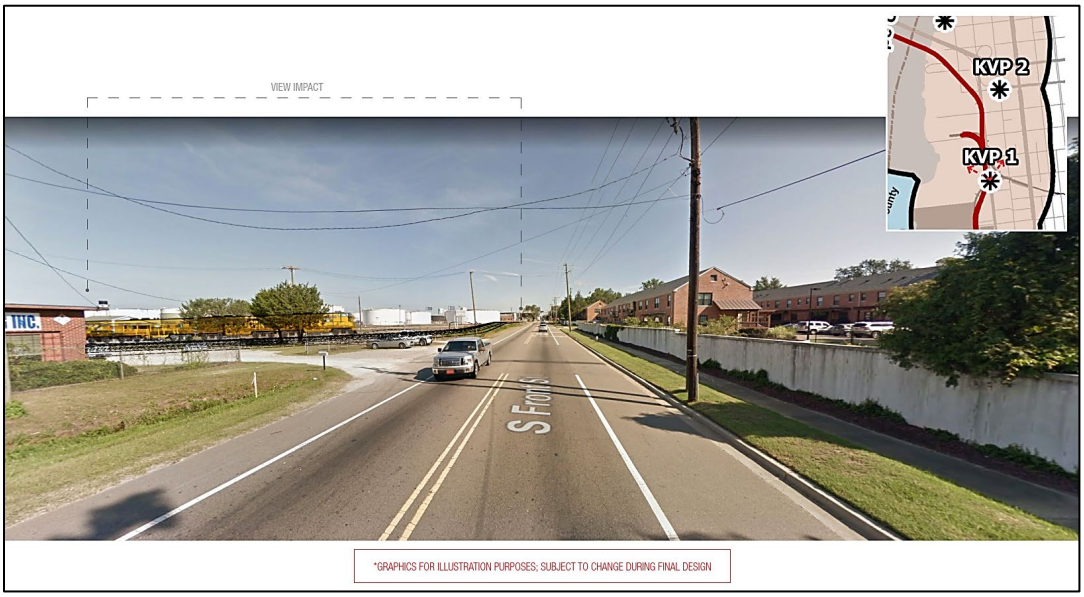

Figure 24: KVP 1 – Proposed view looking north up S. Front Street, from north of Greenfield Street, within Wilmington Historic District at right (east) with addition along historic rail alignment of proposed tracks (yellow freight cars) at left (west)

The additions of the rail line and of the proposed rail bridge will have an overall minor visual effect to the Wilmington Historic District. The Project will not introduce visual and atmospheric elements that diminish the integrity of the historic property's significant historic features. As detailed in the nomination, the "grid of streets extending back from the waterfront," will remain "densely filled with commercial, governmental, ecclesiastical, and domestic buildings of consistent scale." The "townscape" will continue to be "enhanced by the retention of early paving materials, large trees, and street furniture including ironwork and statuary." Also remaining intact will be "the architecture of nearly every period…characterized by a boldness and directness that place grand effect over precision of detail…."[24] Within the historic district's 2003 expansion area, which added to the southern end of the historic district closest to proposed rail line near the Cape Fear's east bank, the "components of the residential, industrial, institutional, and commercial developments important to the history of Wilmington's working class" will remain intact. The resources will continue to "share a predominantly urban setting of houses and buildings set close to the street and to each other on narrow lots connected by sidewalks, grid-patterned streets, periodic fenced or hedged front yards, generally dense yard plantings, and intermittent, established canopies of street trees.[25]

While the Project will introduce new elements within the boundaries of the Wilmington Historic District and its setting, the Project will only minimally change the physical features within the property's setting to contribute to its historic significance or introduce visual and atmospheric

[24] Survey and Planning Unit, 1974, "Wilmington Historic District" NRHP nomination form.
[25] Wyatt, Sherry Joiner, and L. Robbie King, 2002, "Wilmington Historic District Boundary Expansion and Additional Documentation" NRHP nomination form.

elements that diminish the integrity of the historic property's significant historic features. The placement of the rail line and rail bridge in portions of the historic district where they cannot be seen or are minimally intrusive to the viewshed of contributing elements of the historic district helps to avoid and minimize any adverse visual and atmospheric effects; therefore, the Project will not adversely affect the historic district's integrity of setting, feeling, and association.

6.2.3 Effects Recommendation

Based on the preliminary engineering design, AECOM recommends that the Project will have **No Adverse Effect** to the Wilmington Historic District.

6.3 USS North Carolina Battleship Memorial Site (Battleship)

6.3.1 Description and Significance

The Battleship was listed in the NRHP as a contributing resource within the Wilmington Historic District in 1974 (Figure 25 and Figure 26). It was individually listed as a National Historic Landmark (NHL) in 1981, which also placed it individually in the NRHP. Section 106 (36 CFR 800.10) and Section 110 (16 USC 470h-2(f)) of the NHPA identify special requirements for protecting NHLs. Section 106 reiterates that "Section 110(f) of the act requires that the agency official, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any National Historic Landmark that may be directly and adversely affected by an undertaking."

The Battleship was commissioned in April 1941. From 1942 through 1945 during World War II, it "participated in virtually all the major campaigns in the Pacific theatre." Decommissioned and mothballed in 1947, the Battleship in 1962 was placed in its permanent berth on the west side of the Cape Fear River in Wilmington, where it was dedicated as a "monument to the heroism of the men and women who served in World War II."[26]

The NRHP nomination's statement of significance notes that the U.S.S. North Carolina was "the first in the American fleet to incorporate new shipbuilding technology. Over 728 feet long and with a normal displacement of 35,000 tons, the North Carolina was considered the most powerful warship afloat and struck such a majestic figure that it was, and still is, called "Showboat."" The nomination, however, does not specifically identify any of the Battleship's physical features as character-defining.[27]

The Battleship was listed in the NRHP under: Criterion A for its participation in the Pacific against Japan during World War II; Criterion B for its association "with the lives of the more than 2,000 crewmen and commanding officers who served aboard her as well as being a memorial to all American service personnel in World War II"; and Criterion C as the "first modern battleship built by the United States after World War I and as the most powerful vessel afloat [which] set the standard for the class and incorporated new shipbuilding technology."[28]

The boundaries in the NRHP nomination were described as the "battleship USS North Carolina and its permanent slip located with the Battleship Memorial Park." They were estimated to encompass approximately 10 acres.[29]

[26] Conlon, Hood, and Mobley,1974, "USS North Carolina" NRHP nomination form.
[27] Ibid.
[28] Ibid.
[29] Ibid.

Figure 25: USS North Carolina, May 30, 2022 (source: https://www.wect.com/2022/05/30/remembering-fallen-aboard-uss-north-carolina/)

Figure 26: USS North Carolina, July 14, 2022 (source: https://www.wwaytv3.com/battleship-repairs-on-pace-for-completion-by-mid-august/)

6.3.2 Relationship of Project to Battleship

The proposed rail bridge will be located approximately 0.6 miles south of the Battleship. The proposed rail line, at its closest point, will be located approximately 2,000 feet to the west.

6.3.3 Visual Effects

The towers of the proposed bridge will be almost imperceptible on the horizon to the southeast of the Battleship due to distance, their location beyond (south of) the Cape Fear Memorial Bridge, and their height, which is lower than those of the Memorial Bridge (Figure 27). The proposed rail line will also not be visible due to distance and tree coverage (Figure 28). The Project will not change the physical features within the property's setting that contributes to its historic significance or introduce visual and atmospheric elements that diminish the integrity of the historic property's significant historic features; therefore, the Project will not adversely affect the Battleship's integrity of setting, feeling, and association.

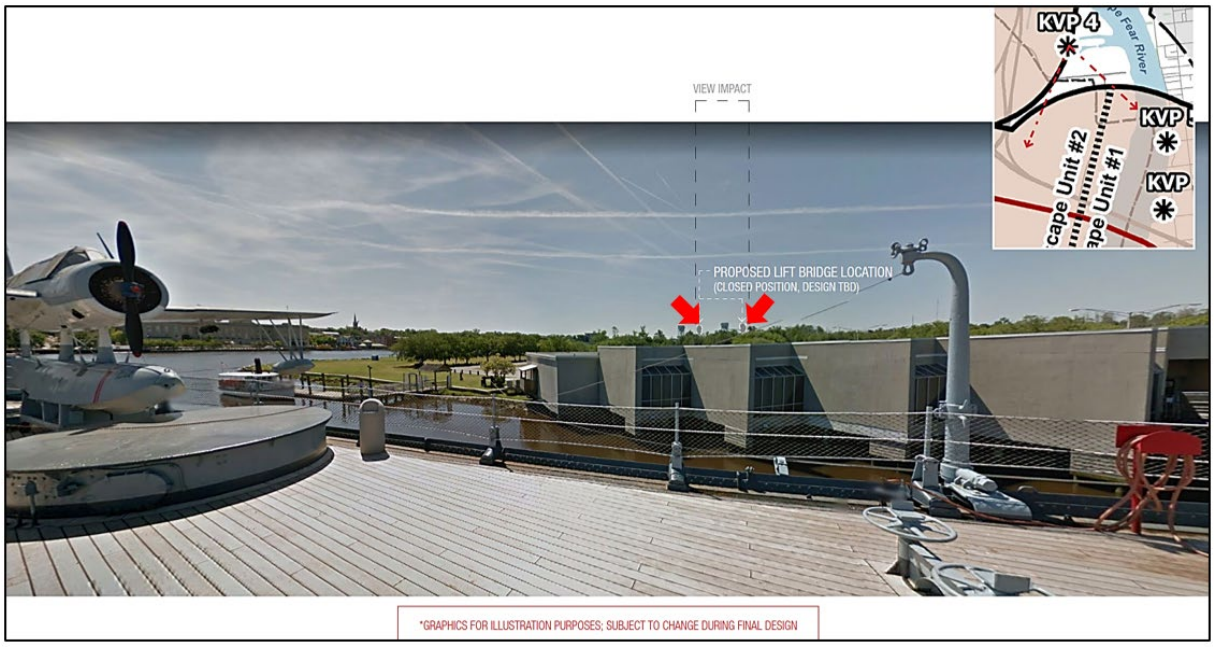

Figure 27: KVP 4[b] – Proposed view looking southeast across US North Carolina deck toward the Visitors Center and Cape Fear River with location of the towers of proposed rail bridge (see arrows) and larger adjacent Memorial Bridge towers at center distance.

Figure 28: KVP 4[a] – Proposed view looking northwest from USS North Carolina conning tower toward bow with addition of thin black lines in distance depicting location of proposed elevated tracks on Eagles Island and mainland

6.3.4 Effects Recommendation

Based on the preliminary engineering plans, AECOM recommends the Project will have **No Adverse Effect** upon the Battleship.

6.4 SEABOARD AIR LINE RAILWAY/ATLANTIC COAST RAILROAD DISTRICT (BELTLINE DISTRICT)

6.4.1 Description and Significance

In a July 12, 2022, letter to the NCHPO, the FRA wrote regarding the freight rail line Beltline[30] District that "FRA will continue to treat this property as eligible for the purposes of the Wilmington Rail Relocation project" and requested additional information on its significance.[31] In an August 4, 2022, letter to FRA, the NCHPO concurred with FRA determination and provided additional information, as follows:

> "The North Carolina State Historic Preservation Office considers the **Seaboard Air Line Railway/Atlantic Coast Railroad Beltline with its connection to Navassa (NH3674)** (as shown on the map below [reproduced in part at Figure 30]) a linear historic district eligible for listing in the National Register of Historic Places under Criterion A for Transportation, Development, and Industry. The system through various mergers and consolidations provided trade and transportation routes mainly to southern and middle Atlantic seaboard states and early twentieth century cities and towns. These connections boosted regional economies and encouraged Wilmington's shipyards as well as other local and regional industries. The Seaboard Air Line Railway/Atlantic Coast Railroad Beltline contributed to the early 20th-century growth in Wilmington by providing trade links with major cities and stimulating local industrial and commercial enterprises through improved transportation services and passenger railways. Indeed, this historic district continues as a major factor in the economic wellbeing of the city and region.
>
> As background to our 2020 concurrence with FRA, we provide the following.
>
> 1. A November 14, 1906 news item from the Wilmington Messenger describes construction of the southern section of the beltline…. The article states that the beltline being constructed by ACL made use of parts of a previously built line that had been abandoned, and that work had started recently and would be completed once the crossing issue was resolved. It concludes, "The

[30] It is important to note that the freight rail line under consideration has two different shorthand designations in this report. One, called the "Beltline," refers to the entire line from Davis Yard to the Port. The other, called the "Beltline District," refers to the NRHP-eligible portion of the freight line, which terminates east of S. Front Street near the southern end of the Preferred Alternative. The Beltline District does not encompass the entirety of the Beltline.

[31] FRA sent a letter to the NCHPO on November 17, 2020, regarding the effects finding for the Improvements to the CSX Railroad SE Line Railroad and Crossings Project, ER 19-2629. FRA's letter stated that "*For the purposes of this Project* FRA is considering the Seaboard Air Line Railway/Atlantic Coast Line Railroad to be eligible for the NRHP (36 CFR Part 800.4(b)(1)" (emphasis added). In a letter of December 15, 2020, responding to FRA's finding, the NCHPO concurred that the proposed ER 19-2629 project would have no adverse effect on the Beltline District. This is an entirely different project that has independent utility from the current Project.

completion of the beltline will be a wonderful help to the wholesale merchants along Water Street" by improving the movement of freight cars around the city.

2. A map of Wilmington from the NC Maps website, undated but believed to be about 1918, shows the configuration of the railroad encircling Wilmington at that time, including the "Belt Line"…. It largely follows the Beltline as it is today, with changes on the north side, mostly in removal of some track that extended into the north side of downtown to Water Street, and some realignment.

3. A circa 1940 streetcar map that shows essentially the same configuration.

We also believe the Seaboard Air Line Railway/Atlantic Coast Railroad Beltline, with its bridges crossing the Cape Fear and Northeast Cape Fear and connecting with the Navassa Yard, retains integrity of setting/location, design, and materials, understanding that while tracks, crossties, signals, etc. are continuously replaced, they are essentially the same as those used in early construction and well into the twentieth century."

6.4.2 Relationship of Project to the Beltline District

Less than 1,000 feet of the Beltline District's approximately 10.5-mile boundary is within the Project's APE. Due to the rail-related nature of the Project and the resource, NCHPO concurred with FRA's decision that the Project's effect assessment for the Beltline District is limited to the portion within the APE (Figure 29 through Figure 33).

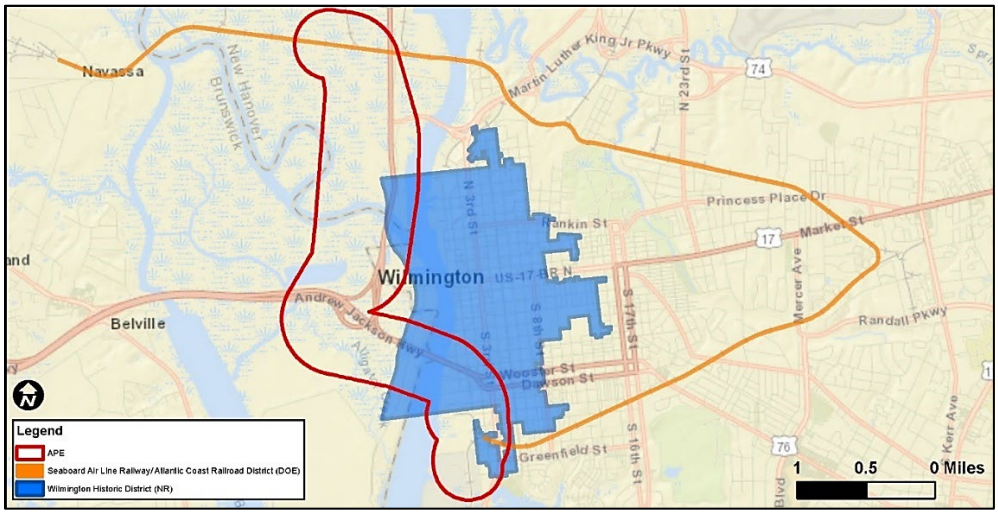

Figure 29: NCHPO GIS map depicting the Beltline District shaded in orange and the APE in red

Figure 30: NCHPO GIS map depicting the portion of the Beltline District within the APE, shaded in orange, at the line's southwest terminus; red outline of APE added to base map; note the boundary terminates short (east of) S Front Street and the continuation of the Beltline south to the Port

Figure 31: Left, looking northwest from South Fourth and Martin streets, where the Beltline enters the APE; right, looking northwest from South Third Street just north of Martin toward the southeastern end of the Beltline District's boundary

Figure 32: Left, looking northwest from the end of the Beltline District's historic boundary toward non-contributing portion to the west of the junction of South Third and Kidder streets; right, looking northwest at non-contributing portion of the Beltline District running from S. Front Street into tank farm

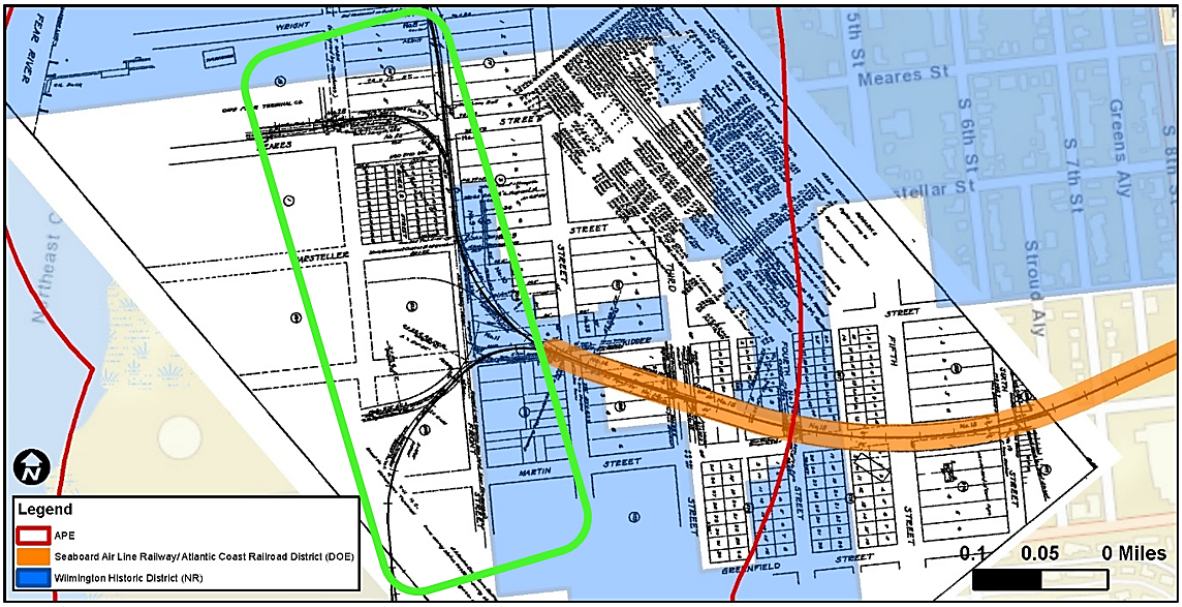

Figure 33: 1935 Atlantic Coast Line map overlaid on modern map with southwest terminus of Beltline District shaded in orange; note continuation of line and spurs along and west of S. Front Street, within green box, that are not part of the Beltline District (source: NCDOT_ValMap_Locations (arcgis.com), Atlantic Coast Line map V11NC_07)

6.4.3 Visual Effects

The proposed rail bridge and the rail line on the west side of the Cape Fear River will not be visible from the Beltline District. On the east side of the Cape Fear River, a small portion of the new line running adjacent to S. Front Street between Marstellar Street and Laughing Oak Lane will be visible from within the Beltline District's boundary. However, most of the Project work will be constructed along S. Front Street along portions of the Beltline that are not included within the Beltline District. Since no Project elements will be visible from the Beltline, the Project will not have a visual effect upon the Beltline's integrity of location, design, setting, materials, workmanship, feeling, and association.

6.4.4 Effects Recommendation

Based on the preliminary engineering plans, AECOM recommends that the Project will have **No Adverse Effect** to the Beltline District.

6.5 HOLY CHURCH OF JESUS CHRIST

6.5.1 Description and Significance

The Holy Church of Jesus Christ, currently Spirit of Truth Ministries (NH3680), is an intact, rectangular, one-story frame building (Figure 34). Clad in original German siding, it is edged by wooden cornerboards that rise from a single-board plinth to the eaves. A stuccoed masonry foundation supports the building and an asphalt-shingled, gable-front roof underpinned by exposed rafter tails tops it. The church has a north-facing front elevation and is three bays wide. A pair of doors, each with five stacked flat panels, is centered in the facade. Single wooden, six-over-six, double-hung sash windows are set to either side of the entry. Plain surrounds frame the double doors and these windows.

All nine side-elevation windows—one is boarded over—match those of the façade and are framed by identical surrounds. Most of the window glass is transparent, but some panes are textured and opaque. Exterior alterations are few, consisting largely of the stoop and bars over all but one of the side-elevation windows.

The church interior has no vestibule; one enters directly into the sanctuary. Original beaded boards clad the ceiling and walls. The wooden floor, laid on the diagonal, and twelve plain wooden pews are likely original. No interior photography was permitted.

Figure 34: Holy Church of Jesus Christ—east side elevation and north façade, at left; façade and west elevation, at right

Deeds suggest the church was erected ca.1926.[32] Initially it served a Holiness or "undenominational" congregation. In 1995 it became associated with the United Pentecostal Church of Wilmington.[33] In 2021 the congregation was affiliated with Spirit of Truth Ministries. The church's first parishioners were white. Since no later than 1995, it has served the local African American community.

[32] New Hanover County Deed Book 170/Page 266 (1926); Hill Directory Co., *Wilmington N.C. City Directory*, 1924, 1926, and 1928.
[33] Deed Book 1857/Pages 902, 903, and 904; Deed Book 1862/Page 925.

To assess the potential NRHP eligibility of the church, numerous other late nineteenth and early twentieth century churches within and near Wilmington were visited. Following the creation of an architectural and historic context for these churches, the Holy Church of Jesus Christ was determined eligible for NRHP listing in 2022. It is a rare surviving example in the Wilmington area of the basic, traditional, rectangular form and frame construction of Protestant meetinghouses of the late nineteenth and early twentieth centuries. It was determined eligible under NRHP Criterion C for embodying the distinctive characteristics of its type. It meets the requirement of Criterion Consideration A as a religious property that derives its significance from its architecture. Furthermore, it retains all seven elements of NRHP integrity—location, design, setting, materials, workmanship, feeling, and association—in support of its significance.

6.5.2 Relationship of Project to the Holy Church of Jesus Christ

The Holy Church of Jesus Christ is located approximately 0.6 miles southeast of the eastern tower of the proposed bridge. It is located approximately 700 feet east, at its closest point, of the rail line portion of the Project on the east side of the river (Figure 4).

6.5.3 Visual Effects

The NRHP-eligible boundary of the Holy Church of Jesus Christ encompasses the 0.053-acre parcel (ID# R05413-033-024-000) that the church trustees acquired in 1925 and upon which they erected the church building ca.1926. The parcel includes a grassy area framing the church building and no built resources other than that building.

The top of the east tower of the proposed rail bridge would be located more than 3,000 feet northwest of the church's NRHP-eligible boundaries. Three blocks of residential and industrial development, two largely vacant lots, and mature trees obscure the bridge site from the church. No part of the bridge would be visible from the church at any time of the year. At its closest point, the rail line portion of the Project will run about 700 feet west of the church, to the west of S. Front Street. Rail traffic will be distant, but partially visible, from the northern edge of the NRHP-eligible boundaries of the church, looking west. The visible portion of the proposed rail line will parallel the line that has run along and west of S. Front Street since the late nineteenth century. This rail line was a fixture when the church was built and has continued so to the present (Figure 35 through Figure 41).

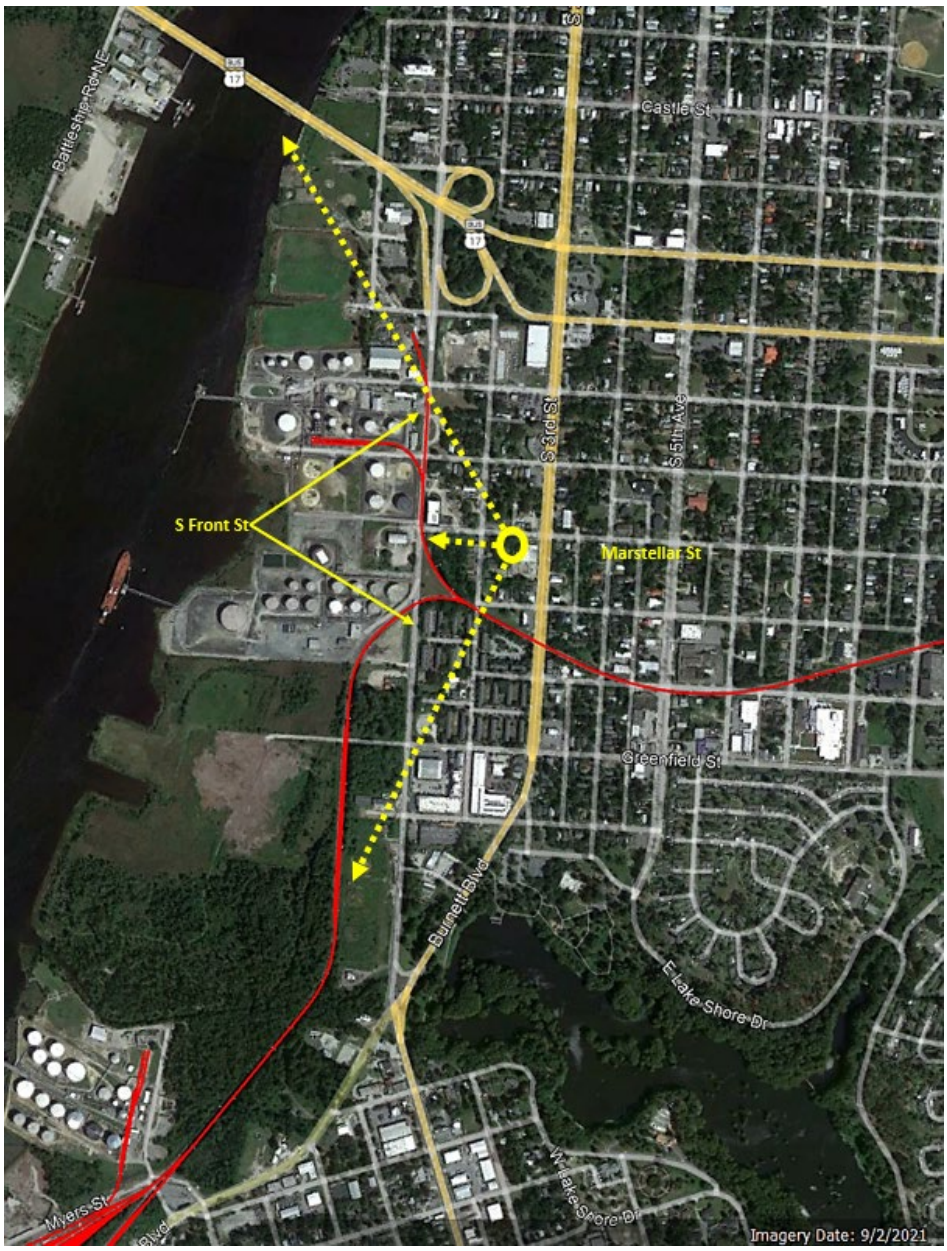

Figure 35: September 2021 Google Map with active rail lines outlined in red, location of Holy Church of Jesus Christ circled, and its views toward the proposed rail bridge and rail line on the east side of the Cape Fear outlined in yellow

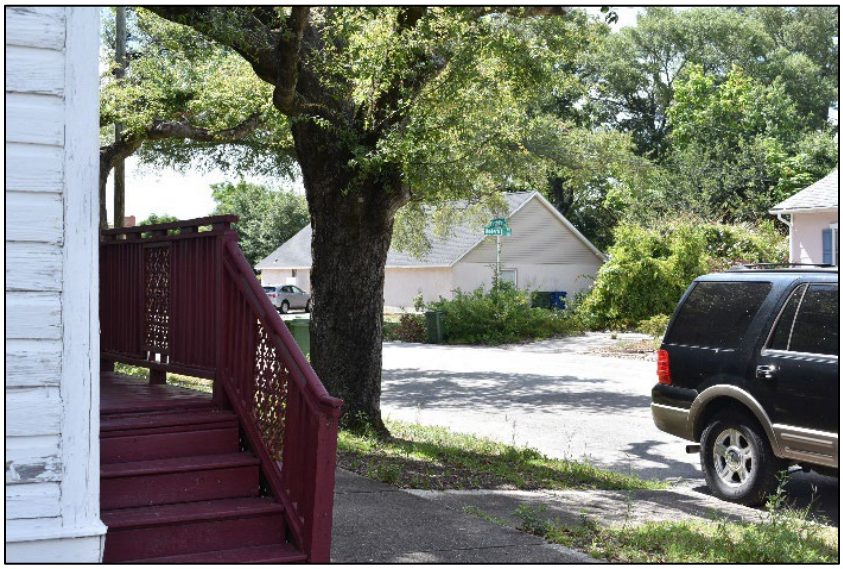

Figure 36: Looking northwest from the church along Marstellar Street in direction of Memorial Bridge and proposed rail bridge

Figure 37: July 2022 Google Maps, looking northwest toward Memorial Bridge, obscured beyond houses and trees

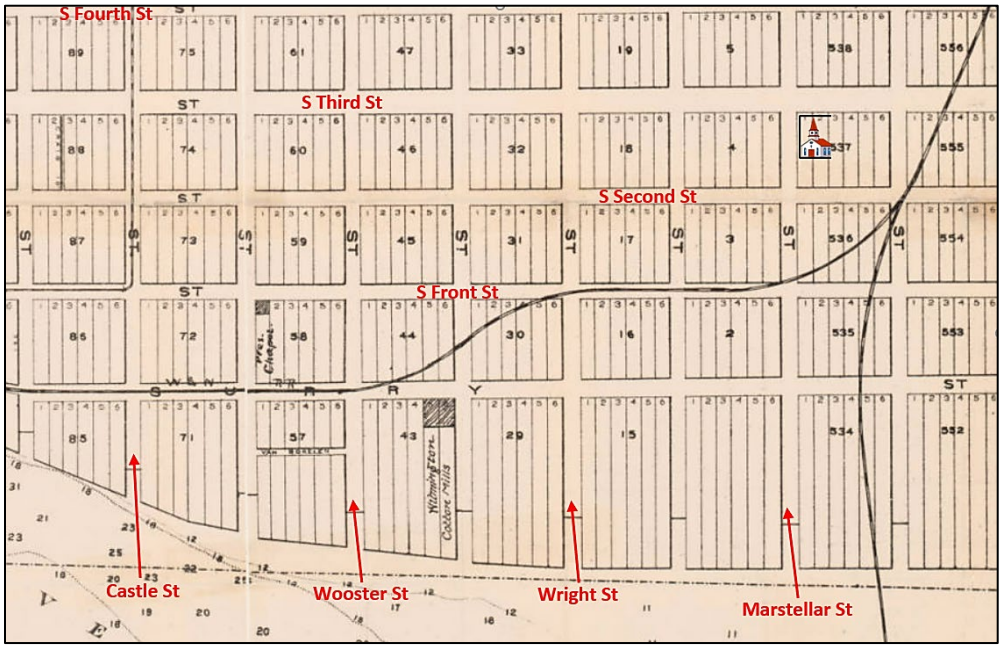

Figure 38: J.L. Becton's "Wilmington, North Carolina" map, ca. 1918—note extensive rail network, particularly at bottom (west side) of map along S. Front Street (source: https://dc.lib.unc.edu/cdm/compoundobject/collection/ncmaps/id/7449/rec/72)

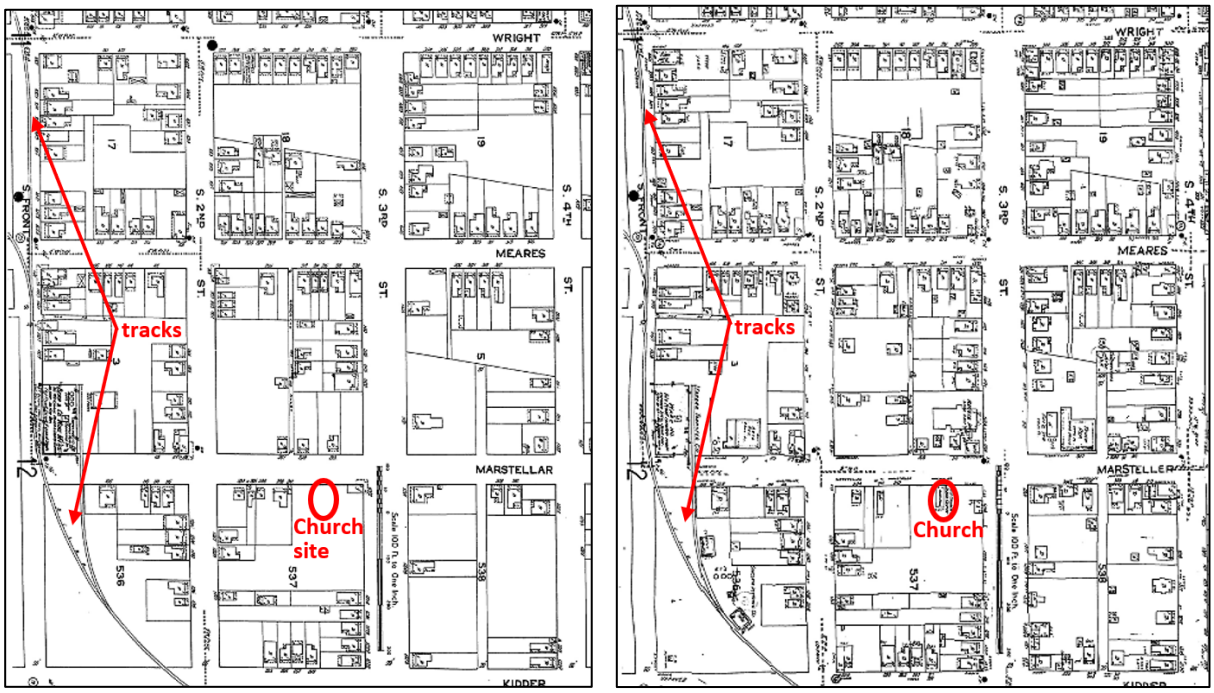

Figure 39: Left, 1915 Sanborn Wilmington map, sheet 41; right, same map updated to 1951; note historic presence of tracks and church or its site

Figure 40: Looking northwest from the church up Marstellar Street with site of projected tracks beyond stop sign at S. Front Street

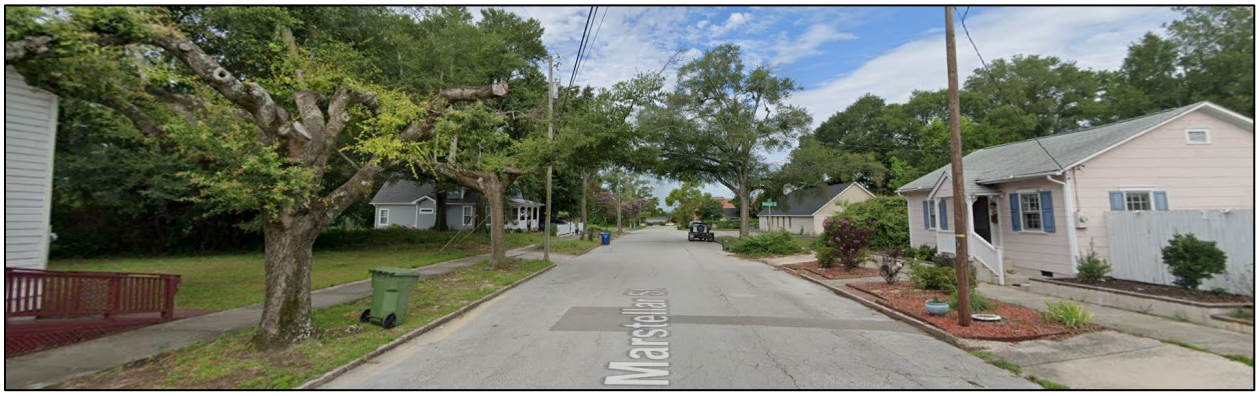

Figure 41: July 2022 Google Maps, looking west toward current tracks at end of street

The proposed new bridge will not be visible from the church, but a small portion of the proposed rail line will be visible in the distance from the northern edge its NRHP-eligible boundaries. That portion of the rail line will run along or immediately adjacent to the Beltline, a historic rail corridor that continues to carry trains. Trains remain active here and will continue to run along S. Front Street under the Build Alternative. As no new visual element will be introduced, the Project will not have a visual effect upon the Church's integrity of setting, feeling, and association.

6.5.4 Effects Recommendation

Based on the preliminary engineering plans, AECOM recommends that the Project will have **No Adverse Effect** to the Holy Church of Jesus Christ.

6.6 CAPE FEAR MEMORIAL BRIDGE

6.6.1 Description and Significance

The FRA and the SHPO conferred about the potential NRHP eligibility of the Cape Fear Memorial Bridge (Figure 42 through Figure 44) in March 2022. In a letter to the SHPO dated April 1, 2022, the FRA determined that the Memorial Bridge was individually eligible for NRHP listing, as follows:

> "According to the information provided by the NCDOT, the Bridge was perhaps the most notable movable bridge constructed in North Carolina from the early 1950s through the late 1970s. When erected between 1966 and 1969, it was North Carolina's first vertical lift span. The Bridge contains a through-truss moveable span between two metal towers, as well as approach spans. The movable span provides a 65-foot vertical clearance for marine traffic while in the closed position – the standard for fixed spans over Intracoastal Waterways at the time – and increases to a 135-foot clearance when raised. The Bridge's mid-rise design allows for shorter approach span lengths, with a movable span opening less frequently than a typical bascule, vertical lift, or swing span structure. It thereby causes fewer interruptions for vehicular traffic and smaller marine vessels. Due to its design, the FRA has determined that the Cape Fear Memorial Bridge is eligible for NRHP listing under Criterion C, for embodying the distinctive characteristics of a type of construction."

Figure 42: Cape Fear Memorial Bridge—left, looking northeast from Battleship Road NE from US Army Corps of Engineers facility at west bank of Cape Fear River; right, looking southeast from Battleship Road NE near Duke Energy Progress substation at river

Figure 43: Cape Fear Memorial Bridge—left, looking southeast from bridge at Colonial Terminal tank farm and Port ; right, looking northeast at Wilmington Historic District and Eagles Island

Figure 44: Cape Fear Memorial Bridge—left, view from Surry Street along former railroad alignment near river; right, looking southwest from Dram Tree Park near river

Construction photos depict the Memorial Bridge rising amidst an industrial environment to its immediate north and south on both banks of the Cape Fear (Figure 45 and Figure 46). Along the river's west bank, to either side of the Memorial Bridge's future site, stood watercraft-related enterprises. On the east bank, tank farms were present. These collections of tanks had configurations different than those along the river at the present, but an equivalent expanse of monolithic storage vessels. Tanks holding oil and gasoline and, at least in 1955, molasses, stood just south of where the footings of the Memorial Bridge's approaches were to touch down. Photographs of the area north of the bridge at the east bank depict the remains of a Carolina Power & Light Company steam plant and other industrial buildings once served by rail spurs. When the bridge went up, this location functioned as a construction staging area. In 2010

a renovated Dram Tree Park reopened near the bridge following remediation of pollutants left behind by one of its former occupants, the Wilmington Manufactured Gas Plant.[34]

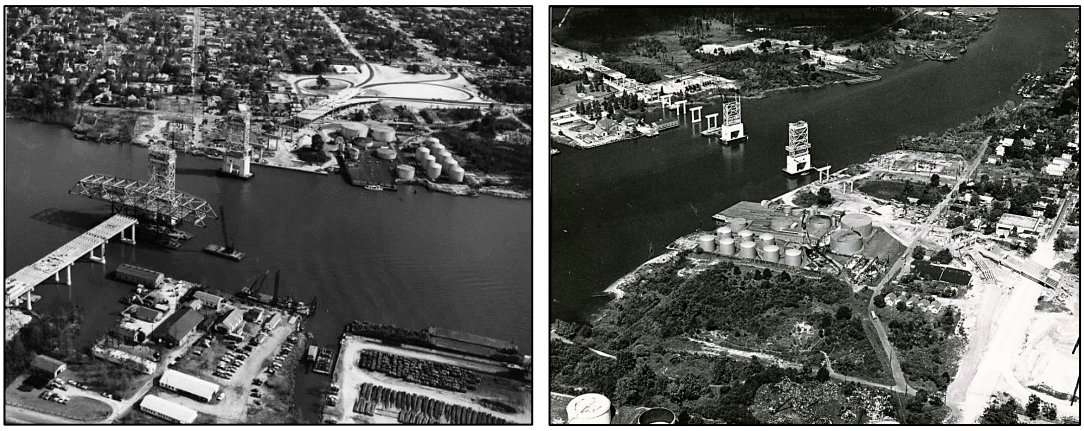

Figure 45: Cape Fear Memorial Bridge—left, looking southeast during construction, ca. 1968-69 (source: New Hanover County Public Library Digital Archives - New Hanover County Public Library Digital Archives (oclc.org) Wilmington Star-News Image Archives); right, looking northwest, September 20, 1969 (source: Wilmington Star-News Image Archives, NHCPL; photographer: Joseph Nesbitt)

Figure 46: Cape Fear Memorial Bridge—looking north at bridge under construction with downtown Wilmington at right (east) and the USS North Carolina at top left (west), ca.1968 (source: Hugh Morton Collection, University of North Carolina, file P081_NTBF4_006256_01)

[34] WWAY, "Dram Tree Park Reopens," October 21, 2010; Gerard, 2013, *A River Journey Through the Heart of North Carolina*.

Historic photographs and maps capture not only the industrial context of the bridge, but its proximity to rail lines. Indeed, when the bridge was erected the rail lines extended beneath the shadow of its approach on the southeast (Figure 47 and Figure 48).

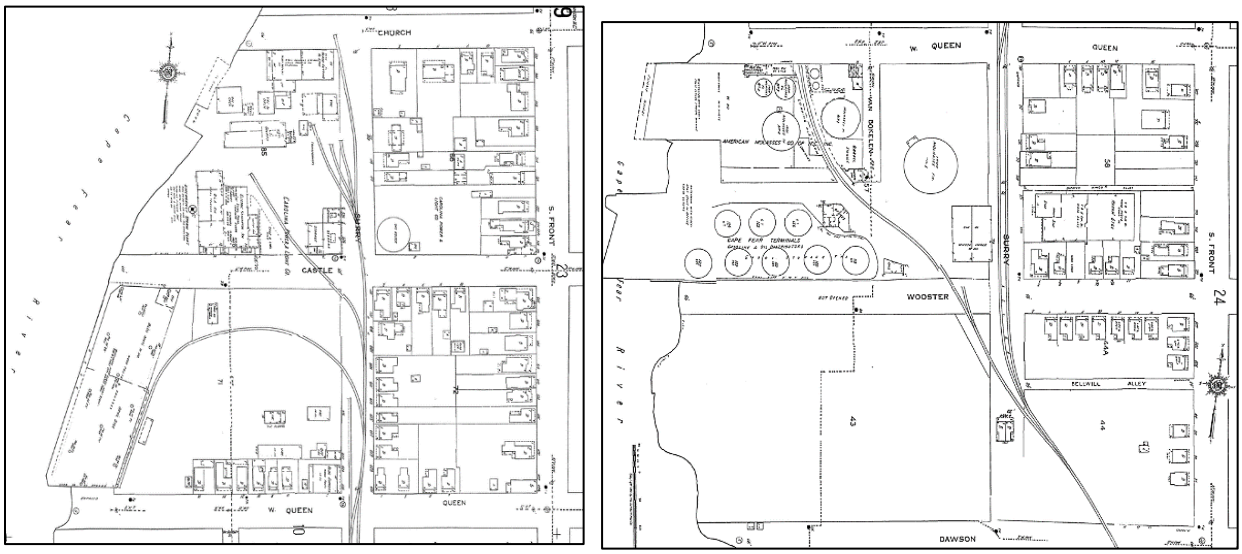

Figure 47: 1955 Wilmington Sanborn Map, vol. 1, showing rail spurs and industrial activities on the northeast side of bridge site (on sheet 9, left), and southeast side of site (on sheet 10, right)

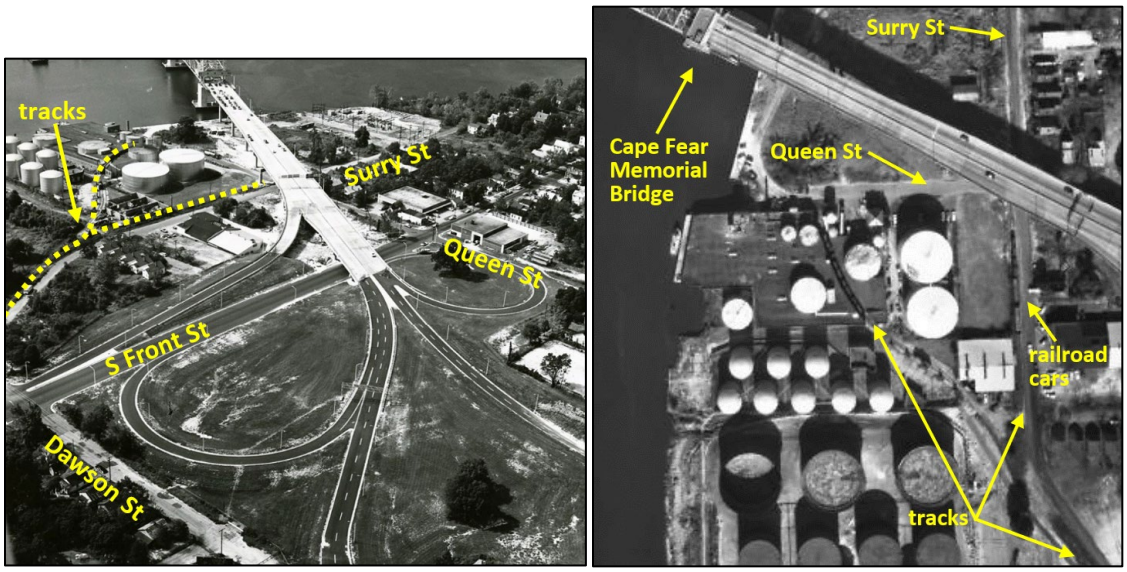

Figure 48: Cape Fear Memorial Bridge—left, annotated December 7, 1971 image (source: NCDOT Historical Aerial Imagery Index (arcgis.com), image m0971_2425_t.jpg); right, annotated 1969 image (source: *Wilmington Star-News*, September 16, 1969)

6.6.2 Relationship of Project to the Memorial Bridge

The proposed rail bridge will be located approximately 250 feet south of the Memorial Bridge. The proposed rail line will extend north of the Memorial Bridge on the west side of the Cape Fear River and south of the Bridge on the river's east side (Figure 4).

6.6.3 Visual Effects

The Memorial Bridge is significant for its notable engineering features under NRHP Criterion C. These features are its through-truss, vertical lift span; the two steel towers upon which that span can be raised and lowered; the wide concrete piers that support the towers; and the cantilevered extensions beyond both towers that hold traffic control gates and parking platforms for the bridge tender and work vehicles (Figure 49 and Figure 50). The approaches beyond these elements are constructed in standard NCDOT fashion for the time (Figure 51 and Figure 52). They are not distinctive characteristics of the lift-bridge's notable type of construction.

Figure 49: Cape Fear Memorial Bridge—looking west at east tower, lift span, and parking platform framed by green guardrails and holding gate, July 2022 (source: GoogleEarth)

Figure 50: Cape Fear Memorial Bridge—looking east at west tower, lift span, parking platforms, and gate, July 2022 (source: GoogleEarth)

Figure 51: Cape Fear Memorial Bridge—looking northeast at western approach from Battleship Road NE on west side of Cape Fear River, July 2022 (source: GoogleEarth)

Figure 52: Cape Fear Memorial Bridge—looking southwest at eastern approach from junction of Surry and Castle streets on east side of Cape Fear River, July 2022 (source: GoogleEarth)

The boundaries for the Memorial Bridge are herein delineated by its notable engineering features (lift span, steel towers, concrete piers, cantilevered extensions) and its approaches, which are its key physical features. Due to the importance of these engineering features, the retention of location, design, material, and workmanship are critical to its retention of significance. Further, Memorial Bridge will also continue to cross the Cape Fear River, as it was intended to; therefore, the integrity of its feeling and association will also remain intact even if its setting is altered (Figure 53 and Figure 54).

Figure 53: KVP 5 – Proposed view looking south along Cape Fear River and Wilmington Riverwalk, south of Ann Street, with more closely spaced towers and lower deck of proposed rail bridge visible beyond Memorial Bridge

Figure 54: KVP 3 – Proposed view—looking southwest from end of Castle Street in Dram Tree Park toward Cape Fear River—with addition of proposed tracks (yellow freight cars), at left (east), and proposed rail bridge, left of Memorial Bridge

As noted at the description and significance section above, the Memorial Bridge was erected within an industrial environment to its immediate north and south on both banks of the Cape Fear. When it was constructed, rail lines on the east side of the river extended up to either side of its eastern approach span. The proposed new bridge and rail line will not change the character of the Memorial Bridge's use or of its physical features that contribute to its historic significance.

While the Project will introduce a new element in the bridge's setting, based on the property type, the physical features of its setting are less important than other aspects of integrity and will not introduce a visual element that will diminish the integrity of the historic property's significant historic features. The proposed line and bridge will therefore not alter the characteristics of the Memorial Bridge that qualified it for NRHP eligibility in a manner that would diminish its NRHP integrity of location, design, setting, materials, or workmanship, and, by extension, its integrity of feeling and association.

6.6.4 Effects Recommendation

Based on the preliminary engineering plans, AECOM recommended that the Project would have **No Adverse Effect** to the Memorial Bridge.

7. SUMMARY OF RECOMMENDATIONS

Based on the analysis presented herein, AECOM recommends the Project will have **No Adverse Effect** to the architecture/history historic properties in the Project APE based on the preliminary plans.

The architecture/history historic properties consist of the following:

- Wilmington Historic District
- USS North Carolina Battleship Memorial Site
- Seaboard Air Line Railway/Atlantic Coast Railroad District
- Holy Church of Jesus Christ
- Cape Fear Memorial Bridge

Effects to archaeological historic properties will be documented in a separate report. FRA will issue its overall findings of effects for the Project in a findings letter.

Since FRA provided funding for preliminary engineering, FRA has overseen the Section 106 process so that if FRA funding is acquired through a future grant, the Project can be efficiently completed. If FRA funding is acquired in the future, FRA will reinitiate the Section 106 review including consultation with consulting parties to review plan development and to confirm or revise its finding. However, if FRA funding is not used for the final design and construction, FRA would not be the lead Federal agency and would have no further obligations under Section 106.

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APPENDIX C: VISUALIZATIONS

LS3P 101 N. Third Street, Suite 500, Wilmington, NC 28401 910.790.9901 / 910.790.3111 fax

CITY OF WILMINGTON
NORTH CAROLINA

Wilmington Rail Realignment

Visualization Study | February 18, 2022

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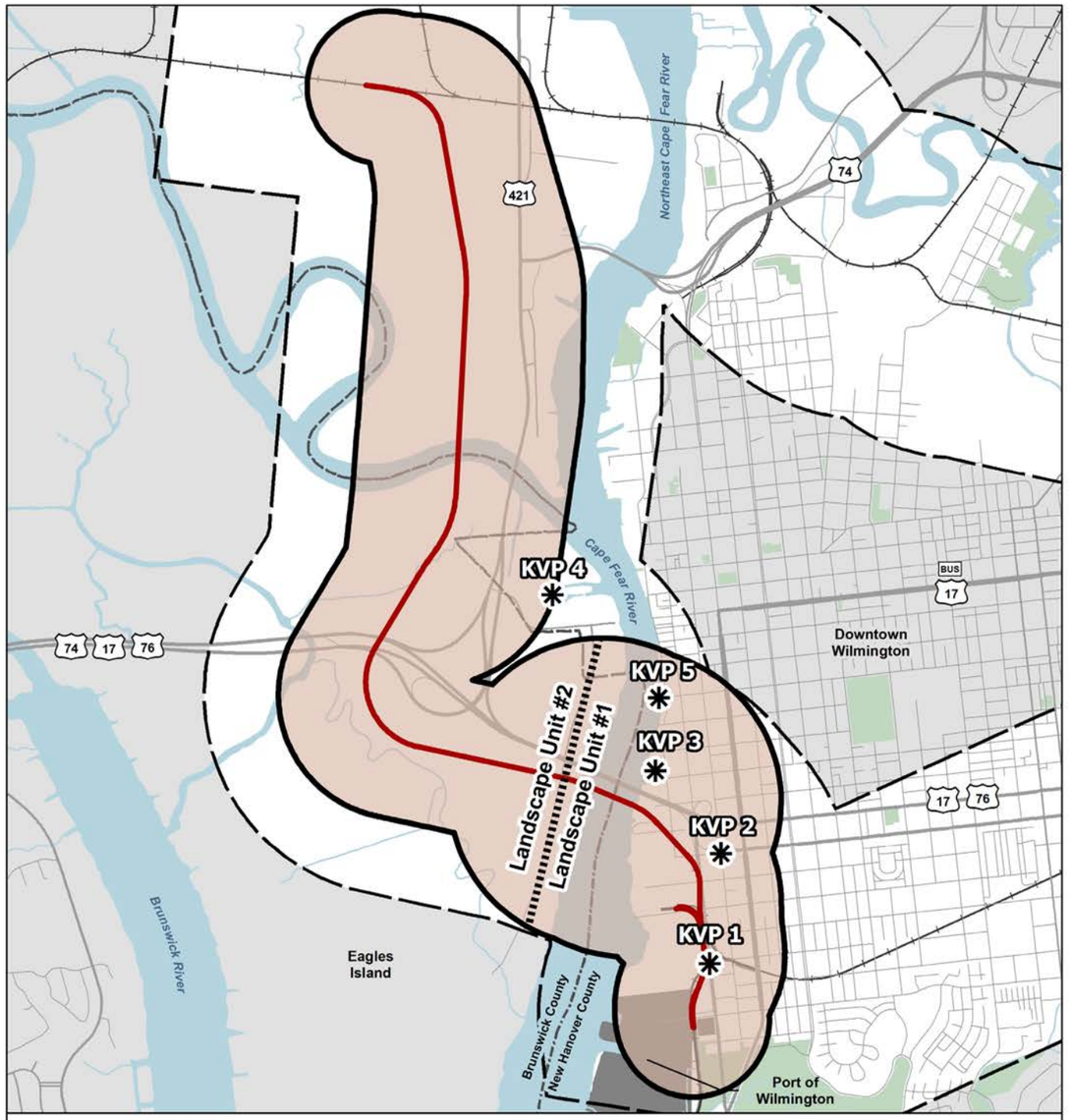

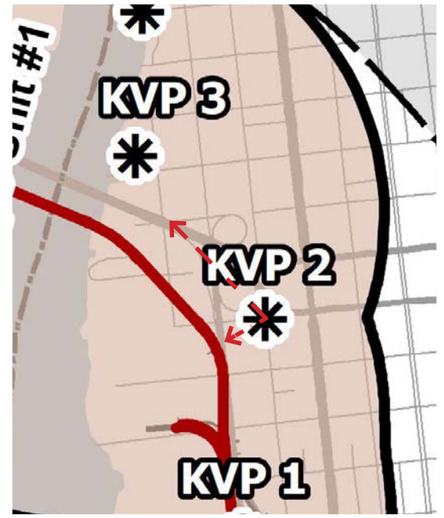

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*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Existing Residential Street View

View From S Front St Looking North

KVP-1

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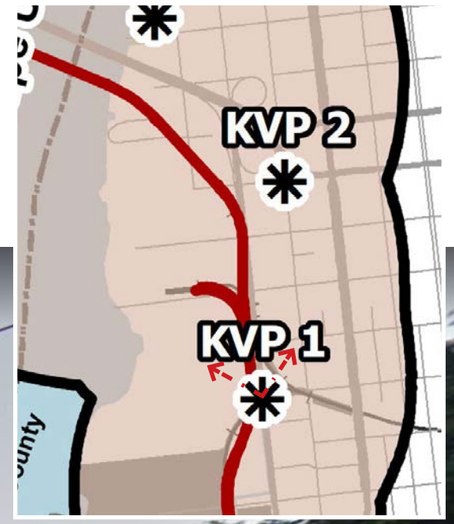

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Proposed Residential Street View

View From S Front St Looking North

KVP-1

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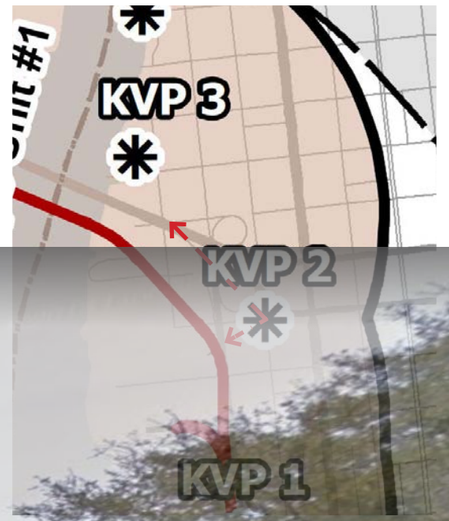

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Existing Historic Wilmington South View

View 17 Off-Ramp Towards Memorial Bridge

KVP-2

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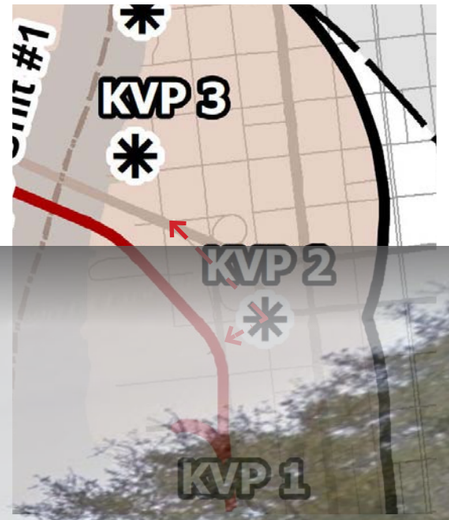

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Proposed Historic Wilmington South View

View 17 Off-Ramp Towards Memorial Bridge

KVP-2

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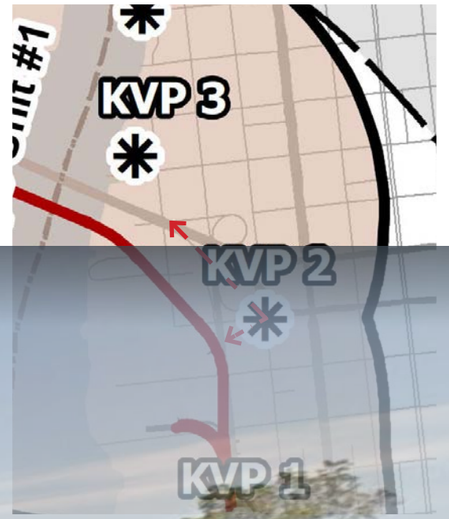

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Existing Dram Tree Park View

View From Entry Drive Towards Bridge

KVP-3

CITY OF WILMINGTON NORTH CAROLINA
WILMINGTON RAIL REALIGNMENT

VISUALIZATIONS
February 18, 2022

AECOM LS3P

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Proposed Dram Tree Park View

View From Entry Drive Towards Bridge

KVP-3

CITY OF WILMINGTON NORTH CAROLINA
WILMINGTON RAIL REALIGNMENT

VISUALIZATIONS
February 18, 2022

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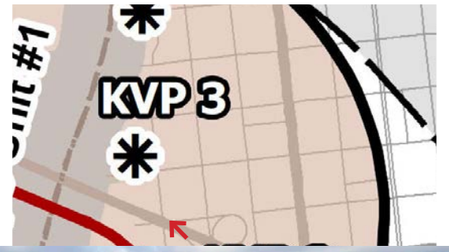

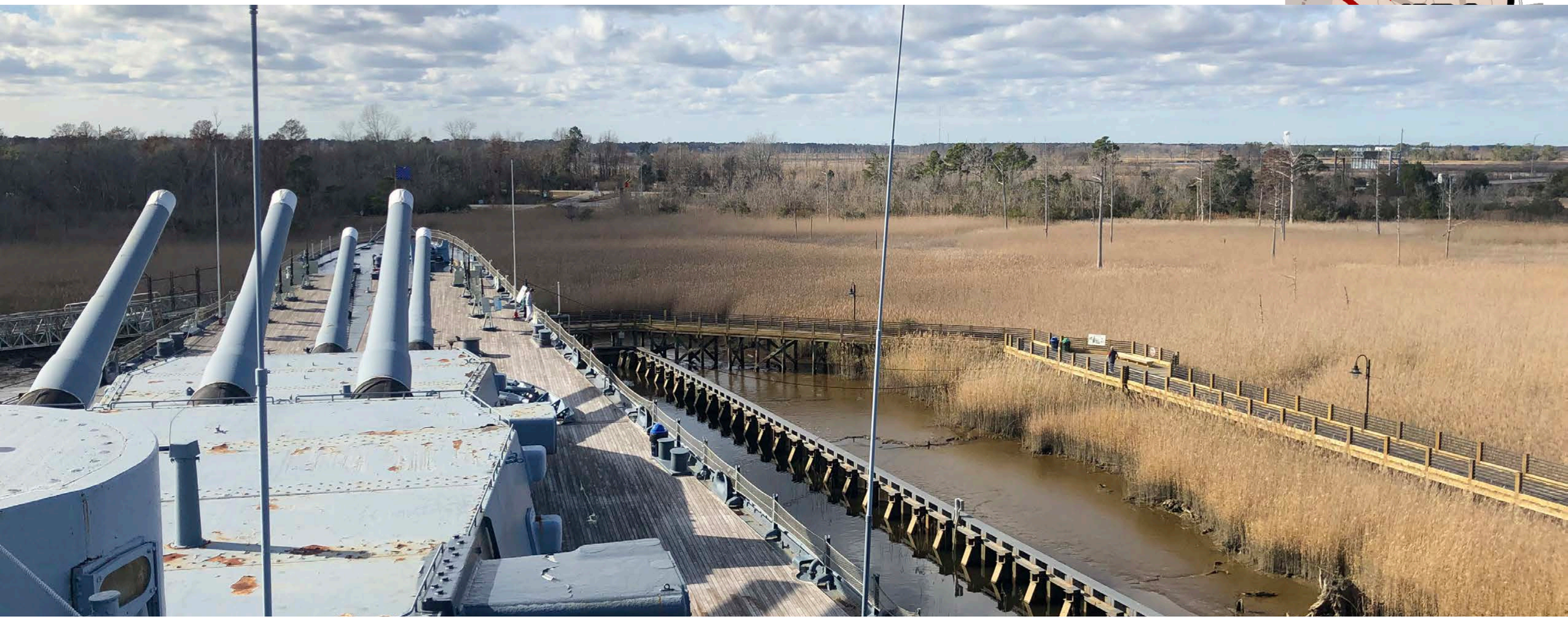

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Existing USS NC Battleship View

Winter View From West End Looking Northwest

KVP-4

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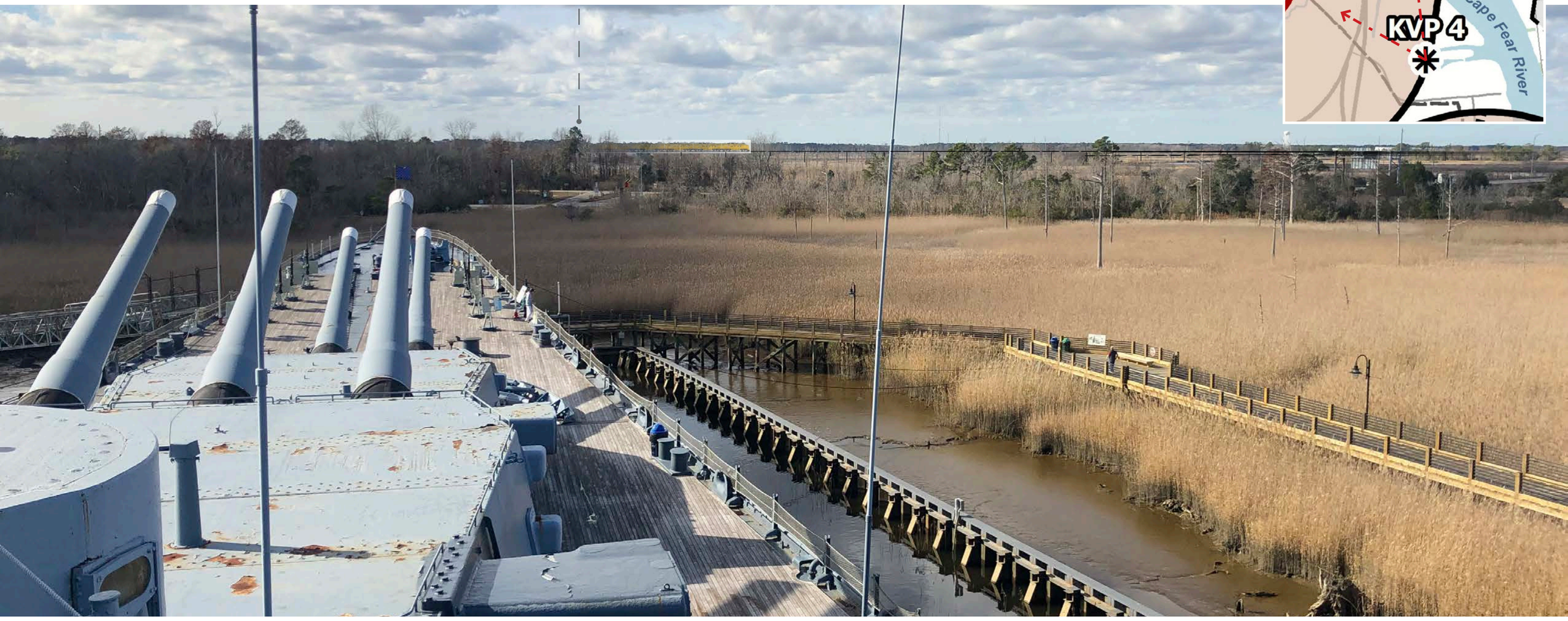

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Proposed USS NC Battleship View

Winter View From West End Looking Northwest

KVP-4

CITY OF WILMINGTON NORTH CAROLINA
WILMINGTON RAIL REALIGNMENT

VISUALIZATIONS
February 18, 2022

AECOM LS3P

VIEW IMPACT

VIEW IMPACT

VIEW IMPACT

*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Existing USS NC Battleship View

View Looking South

KVP-4

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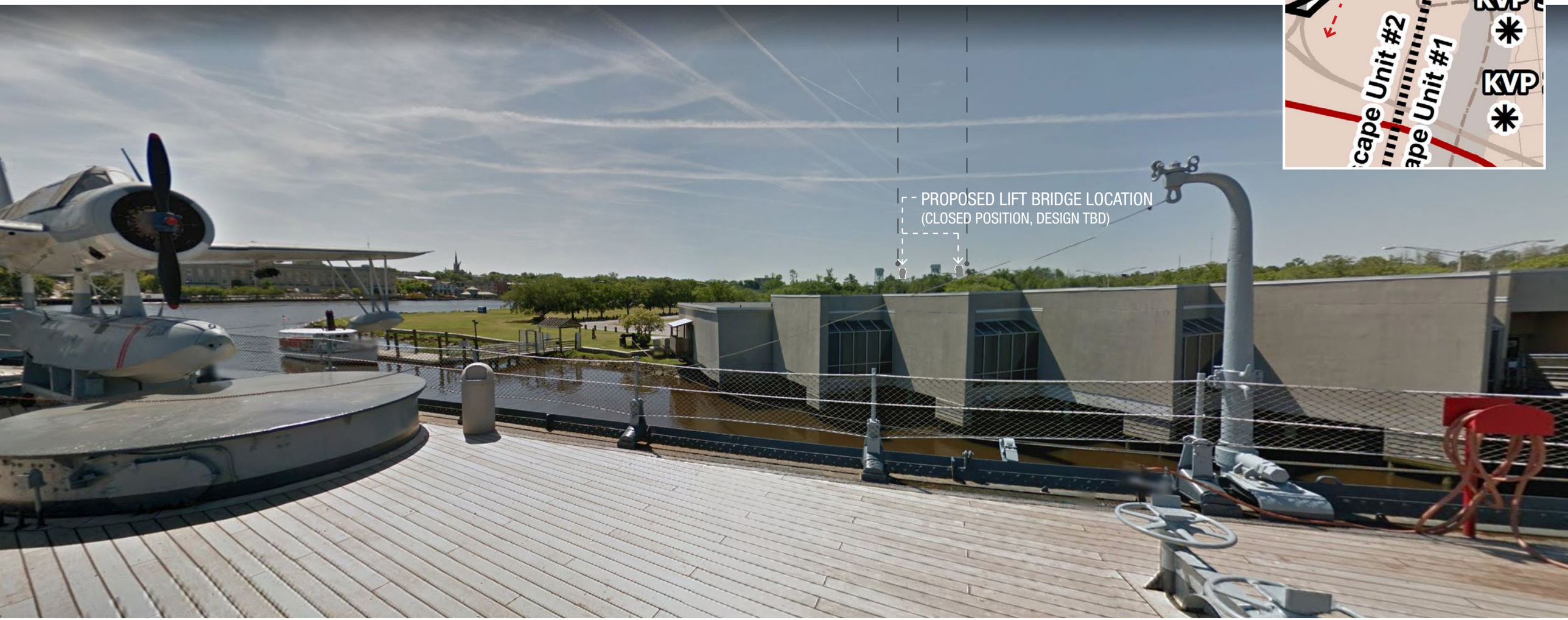
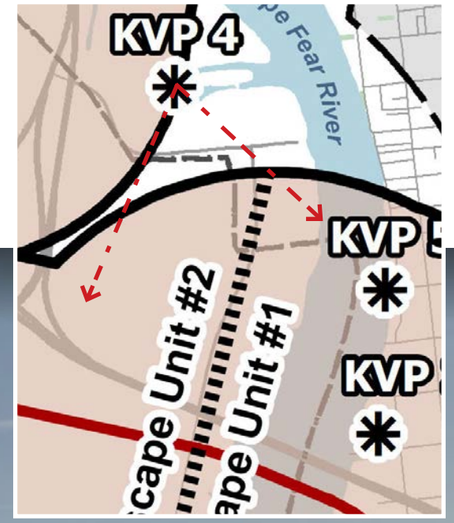




*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Proposed USS NC Battleship View

View Looking South

KVP-4

CITY OF WILMINGTON NORTH CAROLINA
WILMINGTON RAIL REALIGNMENT

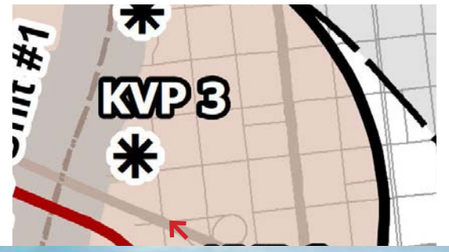
VISUALIZATIONS
February 18, 2022

AECOM LS3P

VIEW IMPACT

VIEW IMPACT

VIEW IMPACT



*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Existing Riverwalk View

View Looking South

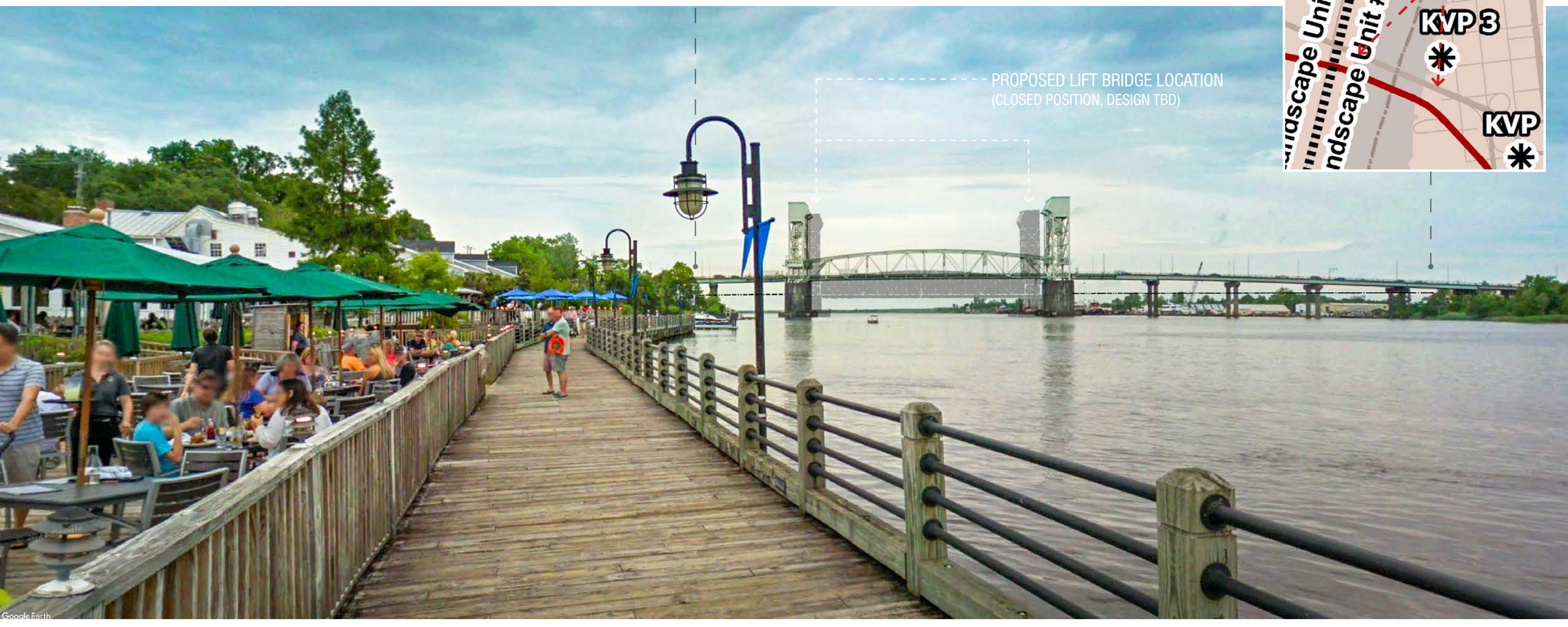
KVP-5

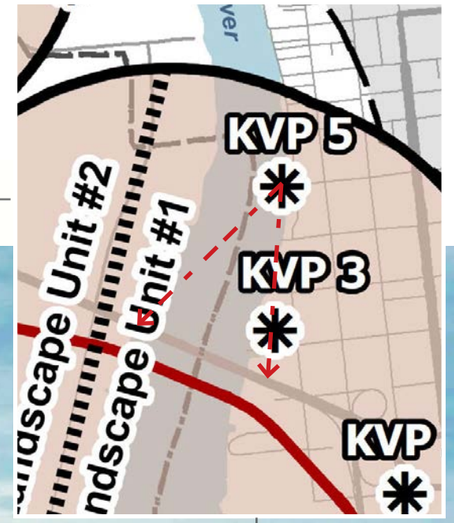
VIEW IMPACT

VIEW IMPACT

VIEW IMPACT

VIEW IMPACT





*GRAPHICS FOR ILLUSTRATION PURPOSES; SUBJECT TO CHANGE DURING FINAL DESIGN

Proposed Riverwalk View

View Looking South

KVP-5

APPENDIX D: NATURAL RESOURCES TECHNICAL REPORT

Wilmington Rail Realignment

Natural Resources Technical Report

For the Preferred Alternative

Prepared For:

Federal Railroad Administration and

the City of Wilmington

Prepared By:

WSP USA and

AECOM

October 2023

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Appendices

1. INTRODUCTION

The City of Wilmington, in coordination with the Federal Railroad Administration (FRA) (lead federal agency) and North Carolina Department of Transportation (NCDOT), is undertaking a study to evaluate realigning an existing CSX Transportation (CSXT) freight rail line. The study, referred to as the Wilmington Rail Realignment (Project), proposes a route to bypass the existing freight rail route between Navassa (Davis Yard) and the Port of Wilmington. Six build alternatives were previously analyzed, and a Natural Resources Technical Report (NRTR) was prepared to assist in the preparation of an Alternatives Analysis (AA). This NRTR has been prepared to evaluate the No-Build and Preferred Alternatives to assist in the preparation of an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) (Appendix A, Figure 1). A brief description of potential natural resources located in the No-Build Alternative, based on a desktop review, is included in this report (Section 3.0). For the Preferred Alternative, physical and biotic resources, protected species, and jurisdictional issues were evaluated within a 79.2-acre Level of Disturbance (LOD) that represents potential locations for permanent and temporary impacts based on the preliminary design for the proposed realignment (Figure 2, Section 4.0).

Several areas totaling approximately 12 acres within the Preferred Alternative LOD are located outside of the six build alternatives shown in the AA report[1]. These 12 acres represent potential construction access locations and minor alignment adjustments made following the AA. The U.S. Army Corps of Engineers (USACE) issued a Preliminary Jurisdictional Determination (PJD) on May 28, 2021, for the potential jurisdictional waters of the U.S. (WOTUS) delineated within the six build alternatives as part of the AA, which included the majority (67.2 acres or approximately 84.8%) of the Preferred Alternative LOD. The 12 acres of the Preferred Alternative LOD that were not included in the May 28, 2021, PJD represent approximately 15.2% of the LOD. On September 20, 2023, the USACE issued a new PJD that included the six build alternatives and the additional 12 acres.

For areas within the Preferred Alternative LOD that are outside of the six build alternatives shown in the AA report, potential jurisdictional WOTUS boundaries, wetland and stream assessment ratings, coastal wetlands, and terrestrial community types were established for this report based on observations made during field work for the AA and spatial data resources (Section 2.2). Selected areas of coastal wetlands identified within the LOD have been reviewed in the field by the North Carolina Division of Coastal Management (DCM). Data presented in this report are for planning purposes only.

[1] AECOM. 2021. Wilmington Rail Realignment Alternatives Analysis. https://www.wilmingtonnc.gov/home/showpublisheddocument/13660/637720626365230000. (Accessed January 27, 2022).

2. METHODOLOGY

2.1 NO-BUILD ALTERNATIVE

A desktop review utilizing geographic information system (GIS) data, web-based applications, and online resources was used to evaluate potential natural resources for the No-Build Alternative corridor. Field work was not conducted to evaluate existing conditions.

2.2 PREFERRED ALTERNATIVE

Natural resources within the 79.2-acre LOD were evaluated through desktop analyses utilizing GIS data, web-based applications, online resources, and data collected in the field. Field work was conducted on February 22-26 and March 1-5, 2021. The field work activities included delineating potential jurisdictional WOTUS (i.e., wetlands, streams, rivers, etc.) and conducting functional assessments of these resources, reviewing the Coastal Area Management Act (CAMA) Areas of Concern (AECs) (coastal wetlands, coastal shorelines, estuarine waters, and public trust areas), identifying terrestrial communities, noting the presence of terrestrial wildlife and invasive plant species, and locating potentially suitable habitat for federally protected species. The qualifications of personnel contributing to the field work and document are shown in Appendix B.

Prior to conducting field work, a desktop analysis was conducted to identify potential jurisdictional wetlands and other WOTUS within the LOD. Information provided by the NCDOT for State Transportation Improvement Program (STIP) Numbers U-4738 (Cape Fear River Crossing project) and U-5731 (US 74 at US 17/ US 421 Flyover Project at Isabel Holmes Bridge project), and by the NC State Port Authority was utilized to map wetlands and other WOTUS that have been previously delineated in areas that overlapped with the Preferred Alternative LOD. The features were verified by the USACE through a PJD for U-4738 (SAW-2004-00821) issued on December 13, 2018, and U-5731 (SAW-2017-01795) issued in 2018, and an Approved Jurisdictional Determination for an NC State Port Authority Port of Wilmington project issued on November 14, 2017. These USACE-verified features were assessed in the field to determine if the previously documented boundaries reflected current conditions.

Wetlands were identified and delineated in accordance with the methodology set forth in the 1987 Corps of Engineers Wetland Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region[2] [3]. Potential jurisdictional WOTUS boundaries were flagged and documented with a sub-meter capable global positioning system (GPS) unit. The GPS-collected data were post-processed using Trimble GPS Pathfinder Office. There were areas on Eagles Island that were inaccessible due to the presence of large streams that were too deep and wide to cross on foot. In addition, the

[2] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, U. S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.

[3] Environmental Laboratory. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region Version 2.0. Vicksburg, Mississippi.

field team did not have permission to access the existing railroad right-of-way at the northern and southern end of the LOD. Wetlands and other WOTUS that were inaccessible or located outside of the area that was delineated for the AA were approximated utilizing aerial imagery and light detection and ranging (LiDAR)[4] [5].

Functional assessments for wetlands were conducted utilizing the North Carolina Wetland Assessment Method (NC WAM)[6]. Functional assessments for streams were conducted utilizing the North Carolina Stream Assessment Method (NC SAM)[7]. Wetland types were determined using a combination of field evaluation and desktop analysis. Desktop resources used to distinguish between brackish marsh and tidal freshwater marsh included aerial imagery, LiDAR, and the mean higher high water (MHHW) tidal datum as shown on the Coastal Resilience mapping program that uses data from the NC Department of Public Safety (NCDPS) Emergency Management[8].

The coastal wetlands AECs were identified according to guidance provided in the *CAMA Handbook for Coastal Development* and were mapped using a combination of field evaluation and desktop analysis[9]. The estuarine waters, public trust areas, and coastal shorelines AECs were identified using NCDOT spatial data[10]. On December 9, 2021, WSP met with the DCM to review potential coastal wetland locations in the field and make refinements of coastal wetlands within the Preferred Alternative LOD. An official determination of coastal wetland boundaries from the DCM was not requested and was not provided.

[4] Google Earth Pro v. 7.3.3.7786. 2019. Wilmington, NC. https://www.google.com/earth/index.html. (Accessed March 26, 2021).

[5] NCDPS, Emergency Management. 2014. North Carolina Spatial Data Download, QL2 LIDAR Data Download. https://sdd.nc.gov/DataDownload.aspx#. (Accessed January 24, 2021).

[6] NC Wetland Functional Assessment Team. 2016. NC Wetland Assessment Method (NC WAM) User Manual Version 5. https://files.nc.gov/ncdeq/Water%20Quality/Environmental%20Sciences/ECO/Wetlands/NC%20WAM%20User%20Manual%20v5.pdf. (Accessed February 11, 2021).

[7] NC Stream Functional Assessment Team. 2015. NC Stream Assessment Method (NC SAM) User Manual Version 2.1. http://www.ncaep.org/resources/Documents/NCSAM/NC%20SAM%20User%20Manual%20v2.1.pdf. (Accessed February 11, 2021).

[8] The Nature Conservancy. 2021. Coastal Resilience Mapping Portal. https://maps.coastalresilience.org/northcarolina/. (Accessed March 24, 2021).

[9] NCDENR. 2014. CAMA Handbook for Coastal Development. https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/CAMA/CAMA%20Handbook%202014%20edition%20printable.pdf. (Accessed March 25, 2021).

[10] NCDOT. 2022. ATLAS Screening Tool. https://gis27.services.ncdot.gov/GISTransScreen/Screening/Home. (Accessed January 4, 2022).

Prior to conducting field work, a list of species protected under the Endangered Species Act (ESA) for Brunswick and New Hanover Counties was obtained from the United States Fish and Wildlife Service (USFWS) Raleigh Ecological Services Field Office. An updated species list using the Information for Planning and Consultation (IPaC) online screening tool for the Preferred Alternative was used to prepare the species lists for this report (Section 4.4.1)[11]. Data provided by the North Carolina Natural Heritage Program (NHP) was reviewed for locations of documented protected species occurrences and bald eagle nests in and within a mile of the LOD[12] [13]. A desktop analysis was performed for potential suitable habitat and bald eagle nesting sites. A field review for suitable habitat and bald eagle nesting sites was conducted in locations identified during the desktop analysis. Results from terrestrial protected species surveys are included in Section 4.0. Details from the surveys are included in Appendix E.

Scientific and common names of all species listed are included in Appendix D.

Other natural resources in the LOD, such as soils, essential fish habitat (EFH), Habitat Areas of Particular Concern (HAPC), primary nursery areas (PNA), anadromous fish spawning areas (AFSA), and Federal Emergency Management Act (FEMA) regulated floodplains were evaluated using desktop analyses[14] [15] [16] [17] [18].

Impacts to resources from the Preferred Alternative were calculated based on preliminary design and are identified as potential permanent and temporary impacts (Section 5.0). At the locations proposed to be bridged, the total width of the potential permanent and temporary LODs is 150 feet. Permanent impacts from bridging assumes an approximately 50-foot wide (25 feet each side of the centerline) footprint for the length of the proposed bridge. Temporary impacts from bridging assumes 50-foot-wide footprint on each side of the permanent LOD.

[11] USFWS. 2023. Information for Planning and Consultation. https://ecos.fws.gov/ipac/. (Accessed October 5, 2023).

[12] NHP. 2021b. North Carolina Natural Heritage Data Explorer. https://ncnhde.natureserve.org/. (Accessed December 28, 2021 and January 6, 2022).

[13] NHP. 2023. North Carolina Natural Heritage Data Explorer. https://ncnhde.natureserve.org/. (Accessed October 25, 2023).

[14] NRCS, USDA. 2019. Web Soil Survey. http://websoilsurvey.sc.egov.usda.gov/. (Accessed January 4, 2022).

[15] NOAA, NMFS. 2021b. Essential Fish Habitat – Data Inventory. Nationwide EFH and HAPC shapefiles. https://www.habitat.noaa.gov/application/efhinventory/. (January 7, 2022 respectively).

[16] ArcGIS Service Directory Feature Service. 2016. North Carolina PNA. https://www.arcgis.com/home/item.html?id=f58338af13be4b14b0656170abb97ed6. (Accessed on April 26, 2021).

[17] NCDEQ, DMF. 2007. Anadromous Fish Spawning Areas: Cape Fear Area Map 7. http://portal.ncdenr.org/web/mf/afsa-maps. (Accessed February 9, 2021).

[18] NCDPS, Emergency Management. 2016. North Carolina Spatial Data Download, Flood Zones Data Download, Flood Hazard Area shapefile. https://sdd.nc.gov/DataDownload.aspx#. (Accessed April 26, 2021).

Permanent impacts from fill are based on preliminary design slope stakes plus an additional 25 feet. Temporary impacts in fill sections include proposed temporary access roads, utility relocations, and material storage.

3. NO-BUILD ALTERNATIVE

The No-Build Alternative includes approximately 9 miles of the existing CSXT freight rail line through the City of Wilmington and runs from Davis Yard to the north to the Port of Wilmington to the south via the CSXT SE line. It runs through mostly natural areas west of the Cape Fear River and mostly developed land east of the Cape Fear River (Figures 1 and 2).

Water resources in the No-Build Alternative corridor are part of the Lower Cape Fear River basin [US Geological Survey (USGS) Hydrologic Unit (HUC) 03030005] and Northeast Cape Fear River basin (USGS HUC 03030007). The existing railroad crosses two unnamed upper tributaries of the Cape Fear River and three named streams: Northeast Cape Fear River, Burnt Mill Creek, and Mineral Springs Branch[19] [20]. Additional streams may be present that are not identified in the National Hydrography Dataset (NHD) and Division of Water Resources (DWR) Surface Water Classifications data. The North Carolina 2020 Final 303(d) list of impaired waters includes the section of Burnt Mill Creek within the No-Build Alternative corridor due to impaired benthos[21].

Potential wetlands in the No-Build Alternative corridor were determined using the DCM wetlands spatial data. Approximately 26.0 acres of wetlands were mapped within a 100-foot corridor of the existing railroad alignment. More than half of the potential wetland areas in the No-Build Alternative alignment, approximately 15.1 acres, occur west of the Hilton Bridge crossing of the Cape Fear River within a 2-mile segment of the existing alignment[22]. Most of these areas are considered riverine swamp forest (approximately 10.3 acres) and freshwater marsh (approximately 4.7 acres). There are several potential wetland areas east of the Cape Fear River within the No-Build Alternative, totaling approximately 10.9 acres. These potential wetlands are mostly associated with drainage features and riparian areas; a majority (approximately 8.3 acres) have been impacted, as noted by the DCM wetland types managed pinelands and drained riverine swamp forest.

Suitable habitat for species federally protected under the ESA and Bald and Golden Protection Act (BGEPA) is not likely present within the No-Build Alternative alignment. A review of NHP records on January 6, 2022, revealed no known occurrences of federally protected species within a 100-foot buffer of the existing railroad alignment. The No-Build Alternative would not result in impacts to protected species and potentially suitable habitat.

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[19] US Geological Survey, National Geospatial Program. 2021. NHD 20200616 for North Carolina State or Territory shapefile. https://www.sciencebase.gov/catalog/item/61f8b8aad34e622189c328b8. (Accessed January 4, 2022).

[20] NCDEQ, DWR. 2021b. NC Surface Water Classifications. https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=6e125ad7628f494694e259c80dd64265. (Accessed January 4, 2022).

[21] NCDEQ, DWR. 2021a. 2020 NC Category 5 Assessments "303(d) List" Final. https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2020/NC_2020_Category5_303dlist.pdf. (Accessed January 4, 2022).

[22] NCDOT. 2022. ATLAS Screening Tool.

All existing conditions would remain the same for the No-Build Alternative except for improvements planned as part of the Wilmington Beltline Improvement Project (NCDOT STIP P-5740) and two additional grade-separated crossings that are planned as part of the Independence Boulevard Project (NCDOT STIP U-4434)[23]. These projects are independent from the Project. Because the No-Build Alternative for this Project would not result in any impacts to natural resources, it is not discussed further in this NRTR.

[23] NCDOT. 2021a. NCDOT: 2020-2029 Current STIP. March 2021. https://connect.ncdot.gov/projects/planning/STIPDocuments1/NCDOT%20Current%20STIP.pdf.

4. PREFERRED ALTERNATIVE

Information presented in this section pertains to the 79.2-acre LOD comprising the Preferred Alternative.

4.1 PHYSICAL RESOURCES

The Preferred Alternative is located within the Middle Atlantic Coastal Plain Level III ecoregion. This ecoregion is characterized by low elevations with extensive areas of flat plains, wetlands, and poorly drained soils[24]. Elevations within the LOD ranged from 0 feet (at sea level) to 26 feet above sea level with an average of 8 feet above sea level[25]. The highest elevations are centered around built-upon areas, with the highest concentration east of the Cape Fear River (Figure 3). Much of the impact area has been influenced by human activities over time, including the marshes west of the Cape Fear River. Human activities influencing the impact area include land development, dredging of the Cape Fear River, soil dredging and spoil disposal areas, agricultural ditches, and infrastructure development (e.g., roadway and utilities)[26].

4.1.1 Soils

The soil types identified within the LOD by the Natural Resources Conservation Service (NRCS) Web Soil Survey are shown below (Table 1)[27]. The LOD is comprised of 71% hydric soils, 21% non-hydric soils, and 8% open water. The locations of the soils type are shown in Appendix A, Figure 4.

[24] Griffth, G., J. Omernik, and J. Comstock. 2002. Ecoregions of North Carolina. https://www.epa.gov/eco-research/ecoregion-download-files-state-region-4#pane-31. (Accessed March 25, 2021).

[25] NC OneMap. 2019. North Carolina Department of Information Technology, Government Data Analytics Center, Center for Geographic Information and Analysis. Contours. https://www.nconemap.gov. (Accessed January 4, 2022).

[26] Environmental Services, Inc. 2011. Eagles Island: A History of a Landscape. https://soilwater.nhcgov.com/wp-content/uploads/2014/05/Eagles-Island-Report_July-2011.pdf. (Accessed March 25, 2021).

[27] NRCS, USDA. Web Soil Survey. 2019.

Table 1: Soils in the LOD

Map Unit Symbol	Map Unit Name	Drainage Class	Hydric Status	Acres in LOD	Percent of LOD[1]
Brunswick County					
CH	Chowan silt loam	Very Poorly Drained	Hydric	27.2	34.3
NhE	Newhan fine sand, dredged, 2 to 30 percent slopes	Excessively Drained	Nonhydric	2.3	2.9
W	Water	N/A	N/A	3.6	4.6
New Hanover County					
DO	Dorovan soils	Very Poorly Drained	Hydric	29.0	36.6
Ur	Urban land	N/A	Nonhydric	14.3	18.1
W	Water	N/A	N/A	2.8	3.5
Totals				**79.2**	**100**

[1]Areas have been rounded to the nearest tenth place.

4.2 WATER RESOURCES

Water resources in the LOD are part of the Lower Cape Fear River basin (USGS HUC 03030005). Eleven streams, including the Cape Fear River and the open water of Alligator Creek (OWA) were identified in the LOD(Tables 2 and 3). Several features identified as streams are likely the result of the modification of an existing stream or creation of a ditch through tidal and brackish/saltwater marsh, as evidenced by unnaturally straight alignments and perpendicular confluences. The feature labeled OWA was created during the construction of the US 17/US 421 interchange in the 1960s[28]. According to the DWR surface water classifications, this feature is considered part of Alligator Creek. The location of each stream is shown in Appendix A, Figures 5-1 to 5-6.

[28] NETR Online. 2021. Historic Aerials. https://www.historicaerials.com/viewer. (Accessed March 24, 2021).

Table 2: Water resources in the LOD

Stream Name[1]	Map ID	DWR Index Number	Best Usage Classification[2]
Alligator Creek	OWA	18-75	SC; Sw
UT to Alligator Creek	SA	18-75	SC; Sw
UT to Alligator Creek	SB (2)	18-75	SC; Sw
UT to Alligator Creek	SX	18-75	SC; Sw
Cape Fear River	Cape Fear River	18-(71)a2a 18-(71)a2b 18	SC
UT to Cape Fear River	SD	18-(71)a2	SC
UT to Cape Fear River	ST	18-(71)a2	SC
UT to Cape Fear River	SU	18-(71)a2	SC
UT to Cape Fear River	SV	18-(71)a2	SC
UT to Cape Fear River	SW	18-(71)a2	SC
UT to Cape Fear River	SAA	18-(71)a2	SC

[1]UT – unnamed tributary
[2]SC – DWR Class SC waters; Sw – swamp waters; see the following paragraph for an explanation of these terms

The best usage classification of Alligator Creek and the Cape Fear River, as defined by DWR, is Class SC. Class SC waters include all tidal salt waters protected for secondary recreation such as fishing, boating, and other activities involving minimal skin contact; fish and noncommercial shellfish consumption; aquatic life propagation and survival; and wildlife. Alligator Creek also has the supplemental classification of Sw (Swamp Waters), which includes those waters that have low velocities and other natural characteristics that are different from adjacent streams[29]. Unnamed tributaries in the LOD draining to Alligator Creek and Cape Fear River are not included on the NC Surface Water Classifications web application and are identified in Table 2 as having the same classification as the receiving waters[30].

[29] NCDEQ, DWR. n/d. Classifications & Standards, Classifications. https://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications. (Accessed January 12, 2022).
[30] NCDEQ, DWR. 2021b. NC Surface Water Classifications.

Table 3: Physical characteristics of water resources in the LOD

Map ID	Bank Height (ft)	Bankfull Width (ft)	Water Depth (in)	Channel Substrate	Velocity	Clarity*
Cape Fear River (1) [1]	4-10	875	U	U	Moderate	Turbid
Cape Fear River (2) [1]	0-0.5	500	U	U	Moderate	Turbid
OWA[1]	0-1	450	U	Silt/Sand	Slow	Slightly Turbid
SA[1]	0-1	10	U	Silt/Sand	Slow	Slightly Turbid
SB (2)[1]	0-0.5	30-50	U	U	Moderate	Turbid
SD[1]	0-0.5	10-20	U	U	Slow	Turbid
SS[2]	U	1-4	U	U	U	U
ST[2]	U	5-10	U	U	U	U
SU[2]	U	1-5	U	U	U	U
SV[2]	U	2-4	U	U	U	U
SW[2]	U	1-6	U	U	U	U
SX[2]	U	6-8	U	U	U	U
SAA[3]	U	5-6	U	U	U	U

*Impact area was evaluated during wetter than normal conditions due to recent precipitation. This may have affected observed turbidity at the time of the site visit.
[1]U=undetermined. Channel depth and stream substrate were undetermined due to water depth.
[2]U=undetermined. Channel depth, stream substrate, velocity, and clarity were undetermined due to inaccessibility; stream was mapped using GIS resources.
[3]U=determined. Channel depth, stream substrate, velocity, and clarity were undetermined because the stream was not evaluated in the field.

In addition to the water resources summarized above, two man-made ditches, TA and TB, were identified as surface waters at the southern end of the impact area. TA (totaling approximately 151 linear feet and 0.04 acre) and TB (totaling approximately 30 linear feet and less than 0.01 acre) in the LOD are included in the impacts assessment (Section 5.0).

There are no designated Outstanding Resource Water (ORW), High Quality Water (HQW) or water supply watersheds (WS-I or WS-II) in the LOD or within 1.0 mile downstream[31]. The portion of the Cape Fear River present in the impact area contains designated PNA (Appendix A, Figure 6) and AFSA[32] [33]. The North Carolina 2020 Final 303(d) list of impaired waters identifies the section of the Cape Fear River from the railroad bridge near Navassa to US 17 [18-(71)a2a] as impaired due to dissolved oxygen, hexavalent chromium fish tissue advisory, and arsenic fish tissue advisory, and the section of the Cape Fear River in the impact area from the US 17 bridge to Greenfield Creek [18-(71)a2b] as impaired due to dissolved oxygen[34].

[31] NCDEQ, DWR. 2021b. NC Surface Water Classifications.
[32] NCDEQ, DMF. 2011. Primary nursery Areas Map 27. http://portal.ncdenr.org/web/mf/primary-nursery-areas. (Accessed February 11, 2021).
[33] NCDEQ, DMF. 2007. Anadromous Fish Spawning Areas: Cape Fear Area Map 7.
[34] NCDEQ, DWR. 2021a. 2020 NC Category 5 Assessments "303(d) List" Final.

4.3 BIOTIC RESOURCES

4.3.1 Natural Heritage Program Natural Areas

Two designated NHP Natural Heritage Natural Areas (NHNA) are located within the LOD: Lower Cape Fear River Aquatic Habitat and Brunswick River/Cape Fear River Marshes[35]. NHNA is defined by NHP as "a site (terrestrial or aquatic) of special biodiversity significance due to the presence of rare species, unique natural communities, important animal assemblages, or other ecological features"[36]. The Lower Cape Fear River Aquatic Habitat supports populations of three federally protected species: Atlantic sturgeon, shortnose sturgeon, and West Indian manatee. The Brunswick River/Cape Fear River Marshes totals approximately 3,873 acres of slightly brackish and freshwater marshes and contains the largest tidal freshwater marsh habitat in North Carolina. According to NHP, this area supports habitat and/or populations for rare and protected species.

4.3.2 Terrestrial Communities

Thirteen terrestrial communities were identified in the LOD. Figures 7-1 to 7-6 in Appendix A show the location and extent of these terrestrial communities. Terrestrial communities that are not regularly maintained or contained within built-upon areas were classified using the *Guide to the Natural Communities of North Carolina: Fourth Approximation* (2012)[37]. Terrestrial community data are presented in the context of total coverage of each type within the LOD(Table 4). Detailed information is included in Appendix C.

[35] NHP. 2023. North Carolina Natural Heritage Data Explorer.

[36] NHP. 2021a. Natural Areas. https://www.ncnhp.org/conservation/natural-areas. (Accessed December 28, 2021).

[37] Schafale, M.P. 2012. Guide to the Natural Communities of North Carolina: Fourth Approximation. https://www.ncnhp.org/media/2/open. (Accessed February 10, 2021).

Table 4: Coverage of terrestrial communities in the LOD

Community	Coverage (ac.)
Maintained/ Disturbed	24.1
Blackwater Bottomland Hardwoods	0.8
Brackish Marsh	8.6
Coastal Fringe Evergreen Forest	1.0
Cypress-Gum Swamp	1.0
Dry-Mesic Oak Hickory	1.4
Estuarine Fringe Pine Forest	0.1
Mesic Mixed Hardwood Forest	<0.1
Salt Shrub	0.1
Small Depression Pocosin	<0.1
Swamp Island Evergreen Forest	0.4
Tidal Freshwater Marsh	21.9
Tidal Swamp	12.9
Total*	**72.3**

*Areas of open water were not included in the table. These areas included streams and ditches and total approximately 6.9 acres.

4.3.3 Terrestrial Wildlife

Terrestrial communities in the LOD are comprised of both natural and disturbed habitats that may support a diversity of wildlife species (those species observed or evidence of species found during field work are indicated with *).

Mammal species that commonly exploit forested habitats and stream corridors likely found near or within the LOD include American beaver*, black bear, bobcat, coyote*, white-tailed deer*, gray fox, Virginia opossum*, eastern cottontail rabbit*, raccoon*, and eastern gray squirrel. Birds that are commonly observed using forest and forest edge habitats likely found near or within the LOD include American crow*, blue jay*, bobwhite quail, brown thrasher*, Carolina chickadee*, cardinal*, Carolina wren*, common flicker, common grackle, eastern bluebird*, fish crow*, mockingbird*, mourning dove*, pileated woodpecker, red-bellied woodpecker*, red-headed woodpecker, song sparrow, tufted titmouse, white throated sparrow, wild turkey, and yellow-rumped warbler*. Birds that are commonly observed using the open habitat or water bodies likely found near or within the LOD include belted kingfisher, boat-tailed grackle, Canada goose, Cooper's hawk, double-crested cormorant, gray catbird*, great blue heron*, great egret, osprey*, red-tailed hawk*, red-winged blackbird*, snowy egret*, and turkey vulture*. Reptile and amphibian species commonly using terrestrial communities near or within the LOD include black racer*, eastern box turtle*, eastern fence lizard, eastern king snake, five-lined skink, eastern garter snake, green anole*, mud turtle*, rat snake, six-lined racerunner, rough green snake, copperhead, spring peeper*, and southern toad.

4.3.4 Aquatic Communities

Aquatic communities in the LOD include the Cape Fear River, unnamed tidal marsh streams, open water, ditches, and small depressional ponds. These communities can support a variety of fish, benthic, mollusk, crustaceous, amphibian, and reptile species.

4.3.5 Invasive Species

Seven species from the *NCDOT Invasive Exotic Plant List for North Carolina* (2012) were found in the LOD[38]. The species identified were Chinese privet (Threat), Chinese tallowtree (Watch List), common reed (Threat), English ivy (Moderate Threat), Japanese honeysuckle (Moderate Threat), Japanese privet (Moderate Threat), and Japanese stilt grass (Threat).

4.4 PROTECTED SPECIES

4.4.1 Endangered Species Act Protected Species

The USFWS IPaC official species lists generated on October 5, 2023, for the Preferred Alternative includes 13 federally protected species under the ESA, one species proposed for listing under the ESA, and one candidate species (Appendix E)[39]. The National Oceanic Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) lists two sturgeon species for North Carolina that are federally protected species under the ESA and are species that occur in ocean, brackish, and fresh waters. The NMFS also lists seven oceanic species protected under the ESA that includes five whale species, oceanic whitetip shark, and giant manta ray[40]. Table 5 includes the listed species for the Preferred Alternative. For the listed sea turtle species, the USFWS has jurisdiction while they are on land and the NMFS has jurisdiction while they are in the open water. Due to the ocean habitat requirements for the whale species, oceanic whitetip shark, and giant manta ray, they will not occur in the LOD and are therefore not discussed further.

For the other listed species shown in Table 5, a discussion of the presence or absence of potential suitable habitat is included below, along with the preliminary effects assessment rendered based on results from habitat assessments and terrestrial protected species surveys in the LOD (Appendix E). Suitable habitat is present for the two sturgeon species, but a preliminary effects assessment was not made. The extent of effects to the sturgeon will be determined through further coordination with NMFS.

In their letter dated September 8, 2022, the USFWS stated, "based on the information provided and other information available, it appears that the proposed action is not likely to adversely affect any federally-listed endangered or threatened species, their formally designated critical habitat, or species currently proposed for listing under the Act at these sites. We believe that the requirements of section 7(a)(2) of the Act have been satisfied for your project." [41] This letter was provided prior to the September 13, 2022, listing of the tricolored bat as a proposed

[38] NCDOT. 2012. Invasive Exotic Plants of North Carolina. https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20and%20Procedures/Invasive_Exotic_Plants_Manual_May_2012.pdf. (Accessed April 4, 2022).
[39] USFWS. 2023. Information for Planning and Consultation.
[40] NOAA, National Marine Fisheries Service (NMFS). 2020b. North Carolina Threatened and Endangered Species and Critical Habitats Under NOAA Fisheries Jurisdiction. https://www.fisheries.noaa.gov/southeast/consultations/north-carolina. (Accessed February 11, 2021).
[41] Benjamin, Pete (USFWS), letter to Kevin Wright (FRA), September 8, 2022.

endangered species and prior to the September 18, 2023 listing of magnificent ramshorn as an endangered species.

Coordination will continue with the USFWS and NMFS as a participating and cooperating agency, respectively, for this Project, to address concerns and implement measures to avoid and minimize impacts to protected species (Appendix F).

Available data for survey windows and habitat descriptions from NCDOT were used in this report[42] [43]. Habitat requirements for each species are based on the best currently available information from referenced literature, NCDOT, USFWS, and NMFS. Results from NHP reports generated on December 28, 2021, and October 5, 2023, identifying known occurrences of protected species within and within 1.0 mile of the LOD are included for each species (Appendix E)[44] [45].

Table 5: ESA federally protected species listed for Preferred Alternative

Scientific Name	Common Name	Federal Status[1]	Suitable Habitat Present	Preliminary Effects Assessment[2]
Plants				
Lysimachia asperulaefolia	Rough-leaved loosestrife	E	No	NE
Thalictrum cooleyi	Cooley's meadowrue	E	No	NE
Mammals				
Myotis septentrionalis	Northern long-eared bat	E	Yes	MA-NLAA
Perimyotis subflavus	Tricolored bat	PE	Yes	Not required
Trichechus manatus	West Indian manatee	T	Yes	MA-NLAA
Balaenoptera borealis	Sei whale*	E	No	NE
Balaenoptera musculus	Blue whale*	E	No	NE
Balaenoptera physalus	Fin whale*	E	No	NE
Eubalaena glacialis	North Atlantic Right whale*	E	No	NE
Physeter macrocephalus	Sperm whale*	E	No	NE
Birds				
Calidris canutus rufa	Rufa red knot	T	No	NE
Charadrius melodus	Piping plover	T	No	NE
Picoides borealis	Red-cockaded woodpecker	E	No	NE

[42] NCDOT. 2021b. Protected Species Protocols – Survey Windows – Habitat Descriptions. https://connect.ncdot.gov/resources/Environmental/EAU/ECAP/Documents/Protected%20Species%20Protocols%20-%20Survey%20Windows%20-%20Habitat%20Descriptions.pdf. (Accessed March 29, 2021).

[43] NCDOT. 2019. Important U.S. Fish and Wildlife (USFWS) Animal At-Risk Species (ARS) in North Carolina & Survey Windows. https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20and%20Procedures/Animal%20Survey%20Windows%20At%20Risk%20Species_20190813.pdf. (Accessed January 4, 2022).

[44] NHP. 2021b. North Carolina Natural Heritage Data Explorer.

[45] NHP. 2023. North Carolina Natural Heritage Data Explorer.

Scientific Name	Common Name	Federal Status[1]	Suitable Habitat Present	Preliminary Effects Assessment[2]
Reptiles				
Alligator mississippiensis	American alligator	T(S/A)	Yes	Not required
Caretta caretta	Loggerhead sea turtle	T	No	NE
Chelonia mydas	Green sea turtle	T	No	NE
Dermochelys coriacea	Leatherback sea turtle	E	No	NE
Eretmochelys imbricate	Hawksbill sea turtle*	E	No	NE
Lepidochelys kempii	Kemp's ridley sea turtle	E	No	NE
Snails				
Planorbella magnifica	Magnificent ramshorn	E	No	NE
Fish				
Acipenser brevirostrum	Shortnose sturgeon*	E	Yes	Unresolved
Acipenser oxyrhynchus oxyrhynchus	Atlantic sturgeon*	E	Yes	Unresolved
Carcharhinus longimanus	Oceanic whitetip shark*	T	No	NE
Manta birostris	Giant manta ray*	T	No	NE

[1]T – Threatened; E – Endangered; PE – Proposed Endangered; T(S/A) — Threatened due to similarity of appearance

[2] NE — No Effect; MA-NLAA — May Affect-Not Likely to Adversely Affect.

* — Species listed by NMFS only

Rough-leaved loosestrife

USFWS Optimal Survey Window: mid-May – September

Habitat Description: Rough-leaved loosestrife, endemic to the Coastal Plain and Sandhills of North and South Carolina, generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins in dense shrub and vine growth on moist to seasonally saturated sands and on shallow organic soils overlaying sand (spodosolic soils). Occurrences are found in such disturbed habitats as roadside depressions, maintained power and utility line rights-of-way, firebreaks, and trails. The species prefers full sunlight, is shade intolerant, and requires areas of disturbance (*e.g.*, clearing, mowing, periodic burning) where the overstory is minimal. It can, however, persist vegetatively for many years in overgrown, fire-suppressed areas. Blaney, Gilead, Johnston, Kalmia, Leon, Mandarin, Murville, Torhunta, and Vaucluse are some of the soil series that the plant occurs on.

Preliminary Effects Assessment: No Effect

Much of the LOD is comprised of marshes with thick vegetation that were not considered to be suitable for rough-leaved loosestrife. Vegetated areas absent of thick woody stems and vines with open canopies along the road and near development are regularly mowed and, therefore, would not allow for the establishment of the species. During habitat assessments conducted on February 22-26 and March 1-5, 2021, potential suitable habitat was identified across from USS North Carolina Road, west of US 17. On April 8, 2021, a survey was conducted by DCA in this area. During the survey it was determined that the powerline corridor, marshes, and tidal floodplain habitats in this area were not suitable habitat; therefore, no suitable habitat is present in the LOD. A review of NHP records, dated December 28, 2021 and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Cooley's meadowrue

USFWS Optimal Survey Window: mid June – early July

Habitat Description: Cooley's meadowrue, documented in the Pine Savanna natural community, occurs in circumneutral soils in sunny, moist to wet grass-sedge bogs, wet-pine savannas over calcareous clays, and savannah-like areas, often at the ecotones of intermittent drainages or non-riverine swamp forests. This rhizomatous perennial herb is also found along plowed firebreaks, roadside ditches and rights-of-way, forest clearings dominated by grass or sedge, and power line or utility rights-of-way. The species requires some type of disturbance (e.g., mowing, clearing, periodic fire) to maintain its open habitat. The plant typically occurs on slightly acidic (pH 5.8-6.6) soils that are loamy fine sand, sandy loam, or fine sandy loam; at least seasonally moist or saturated; and mapped as Foreston, Grifton, Muckalee, Torhunta, or Woodington series.

Preliminary Effects Assessment: No Effect

Much of the LOD is comprised of marshes with thick vegetation and standing water that were not considered to be suitable habitat for Cooley's meadowrue. Open areas consisted of maintained grass and deep water along the road. Open areas without deep water were covered in dense woody vines. These areas are not suitable habitat. During habitat assessments conducted on February 22-26 and March 1-5, 2021, potential suitable habitat was identified across from USS North Carolina Road, west of US 17. On April 8, 2021, a survey was conducted by DCA in this area. During the survey, it was determined that the powerline corridor, marshes, and tidal floodplain habitats in this area were not suitable habitat; therefore, no suitable habitat is present in the LOD. A review of NHP records, dated December 28, 2021 and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Northern long-eared bat

USFWS Recommended Survey Window: May 15 – August 15 (summer survey window)

Habitat Description: In North Carolina, the Northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern North Carolina. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Preliminary Effects Assessment: May Affect – Not Likely to Adversely Affect

During habitat assessments conducted on February 22-26 and March 1-5, 2021, it was determined suitable habitat was present for NLEB in areas with snags and non-isolated trees with a dbh greater than 3 inches. According to records from March 24, 2020, presented by the USFWS Raleigh Ecological Services Field Office, there are no known NLEB winter roost trees in Brunswick and New Hanover Counties. A review of NHP records on December 28, 2021, indicated a known occurrence within 1.0 mile of the LOD. However, a review of NHP records, dated October 25, 2023, indicated no known occurrences within 1.0 mile.

Tricolored bat

Anticipated USFWS Recommended Survey Window: May 15 – August 15 (summer survey window)

Habitat Description: Tricolored bats primarily roost among live and recently dead hardwood trees during the spring, winter, and summer. In the southern portion of its range, tricolored bats will also roost in Spanish moss. This bat is also known to roost during the summer among pine needles, eastern red cedar (*Juniperus virginiana*), within artificial roosts (e.g., barns and bridges), and caves. Tricolored bats hibernate during the winter months in caves, mines, and abandoned tunnels. In the southern U.S., they may also hibernate in culverts. Tricolored bats typically forage near or above treetops but may also forage closer to the ground. They are known to forage most commonly over waterways and forest edges.

Preliminary Effects Assessment: Not Required

The USFWS announced a proposal on September 13, 2022, to list the tricolored bat as endangered. The final decision for this listing is expected in late 2023. If listed, recommended survey windows, suitable habitat descriptions and a distribution range will be provided by USFWS. This information, when available, will help to inform determinations on habitat that could be impacted by the proposed project. Section 7 consultation with USFWS will be conducted, as appropriate, if the species is listed and prior to final design.

Suitable roosting habitat is present in the project study area in locations having live and recently dead hardwood trees, as well as in bridges. Foraging habitat is present along forest edges. A review of NHP records, dated October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

West Indian manatee

USFWS Recommended Survey Window: year-round

Habitat Description: Manatees have been observed in all the North Carolina coastal counties. Manatees are found in canals, sluggish rivers, estuarine habitats, saltwater bays, and as far off shore as 3.7 miles. They utilize freshwater and marine habitats at shallow depths of 5 to 20 feet. In the winter, between October and April, manatees concentrate in areas with warm water. During other times of the year habitats appropriate for the manatee are those with sufficient water depth, an adequate food supply, and in proximity to freshwater. Manatees require a source of freshwater to drink. Manatees are primarily herbivorous, feeding on any aquatic vegetation present, but they may occasionally feed on fish.

Preliminary Effects Assessment: May Affect – Not Likely to Adversely Affect

Suitable habitat for the West Indian manatee is present in the Cape Fear River and streams with water depths greater than or equal to 5 feet. A review of NHP records on December 28, 2021, indicates a known occurrence within 1.0 mile of the LOD. However, a review of NHP records, dated October 25, 2023, indicated no known occurrences within 1.0 mile. Construction activities in suitable habitat will adhere to *Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters*[46].

Rufa red knot

USFWS Recommended Survey Window: year-round

Habitat Description: The rufa red knot is one of the six recognized subspecies of red knots and is the only subspecies that routinely travels along the Atlantic coast of the United States during spring and fall migrations. It is known to winter in North Carolina and to stop over during migration. Habitats used by red knots in migration and wintering areas are similar in character: coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks. Ephemeral features such as sand spits, islets, shoals, and sandbars, often associated with inlets, can be important habitat for roosting.

Preliminary Effects Assessment: No Effect

No suitable habitat is present in the LOD for the rufa red knot due to the absence of beach and mud flat habitats. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Piping plover

USFWS Recommended Survey Window: year-round

Habitat Description: The piping plover breeds along the entire eastern coast of the United States. North Carolina is uniquely positioned in the species' range, being the only state where the piping plover's breeding and wintering ranges overlap and the birds are present year-round. They nest most commonly where there is little or no vegetation, but some may nest in stands of beach grass. The nest is a shallow depression in the sand that is usually lined with shell fragments and light-colored pebbles.

Preliminary Effects Assessment: No Effect

[46] USFWS. 2017. Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters. https://saw-reg.usace.army.mil/ESA/manatee_guidelines.pdf. (Accessed April 4, 2022).

No suitable habitat is present in the LOD for the piping plover due to the absence of beach and sandy tidal flat habitats. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Red-cockaded woodpecker

USFWS Recommended Survey Window: year-round; November – early March (optimal)

Habitat Description: The red-cockaded woodpecker (RCW) typically occupies open, mature stands of southern pines, particularly longleaf pine, for foraging and nesting/roosting habitat. The RCW excavates cavities for nesting and roosting in living pine trees aged 60 years or older, which are contiguous with pine stands at least 30 years of age, to provide foraging habitat. The foraging range of the RCW is normally no more than 0.5 miles.

Preliminary Effects Assessment: No Effect

During habitat assessments conducted on February 22-26 and March 1-5, 2021, it was determined suitable foraging or nesting/roosting habitat for RCW is not present in the LOD because no pine stands are located within the LOD. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

American alligator

USFWS Recommended Survey Window: year-round (only warm days in winter)

Habitat Description: In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found in rivers, streams, canals, lakes, swamps, and coastal marshes. Adult animals are highly tolerant of saltwater, but the young are apparently more sensitive, with salinities greater than 5 parts per thousand considered harmful. The American alligator remains on the protected species list due to its similarity in appearance to the Endangered American crocodile.

Preliminary Effects Assessment: Not Required

Suitable habitat is present in the LOD for the American alligator; however, it is listed as threatened due to similarity of appearance and, therefore, does not require Section 7 consultation with the USFWS. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates a known occurrence within 1.0 mile of the LOD.

Loggerhead sea turtle

USFWS/NMFS Recommended Survey Window: April – August

Habitat Description: The loggerhead is widely distributed within its range and is found in three distinct habitats during their lives. These turtles may be found hundreds of miles out in the open ocean, in neritic areas, or on coastal beaches. In North Carolina, this species has been observed in every coastal county. Loggerheads occasionally nest on North Carolina beaches and are the most common of all the sea turtles that visit the North Carolina coast. They nest nocturnally, at

two to three-year intervals, between May and September, on isolated beaches that are characterized by fine-grained sediments. In near-shore areas, loggerheads have been observed in bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and shipwrecks are often used as foraging areas.

Preliminary Effects Assessment: No Effect

No suitable habitat is present in the LOD for the loggerhead sea turtle because the LOD is not located in a near-shore area. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Green sea turtle

USFWS/NMFS Recommended Survey Window: April – August

Habitat Description: The green sea turtle is found in temperate and tropical oceans and seas. Nesting in North America is limited to small communities on the east coast of Florida, requiring beaches with minimal disturbances and a sloping platform for nesting (they do not nest in NC). The green sea turtle can be found in shallow waters. They are attracted to lagoons, reefs, bays, mangrove swamps and inlets where an abundance of marine grasses can be found, as this is the principal food source for the green turtle.

Preliminary Effects Assessment: No Effect

No suitable habitat is present in the LOD for the green sea turtle due to the absence of lagoon, reef, bay, mangrove swamp, and ocean inlet habitats. Furthermore, the LOD is located in waters that do not support the growth of marine grass, which is a principal food source for the sea turtle. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Leatherback sea turtle

USFWS/NMFS Recommended Survey Window: April – August

Habitat Description: Leatherbacks are distributed world-wide in tropical waters of the Atlantic, Pacific, and Indian oceans. They are generally open ocean species and may be common off the North Carolina coast during certain times of the year. However, in northern waters, leatherbacks are reported to enter into bays, estuaries, and other inland bodies of water. Major nesting areas occur mainly in tropical regions. In the United States, primary nesting areas are in Florida; however, nests are known from Georgia, South Carolina, and North Carolina as well. Nesting occurs from April to August. Leatherbacks need sandy beaches backed with vegetation in the proximity of deep water and generally with rough seas. Beaches with a relatively steep slope are usually preferred.

Preliminary Effects Assessment: No Effect

No suitable habitat is present in the LOD for the leatherback sea turtle because the LOD is not located in a near-shore area. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Hawksbill sea turtle

USFWS/NMFS Recommended Survey Window: April – August

Habitat Description: Hawksbill sea turtles are found in tropical and subtropical oceans. Sightings have been reported on the east coast of the US as far north as Massachusetts, although rarely north of Florida. Sightings have been recorded from a handful of counties in North Carolina, but the turtle is not known to breed here. Adult hawksbills are found in coastal waters, especially around coral reefs, rocky outcrops, shoals, mangrove bays, and estuaries. Juveniles are often seen offshore in floating mats of seaweed. This species nests on a wide range of beach types and substrates, using both low- and high-energy beaches on islands and mainland sites. The nest is typically placed near or under some vegetation.

Preliminary Effects Assessment: No Effect

No suitable habitat is present in the LOD for the hawksbill sea turtle because the LOD is not located in a near-shore area. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Kemp's Ridley sea turtle

USFWS/NMFS Recommended Survey Window: April – August

Habitat Description: Kemp's ridley sea turtle is the smallest of the sea turtles that visit North Carolina's coast and has been sighted in most coastal counties. While the majority of this sea turtle's nesting occurs in Mexico, the species is known to nest on North Carolina beaches infrequently. Sightings of the species exist for most coastal counties. Kemp's ridley sea turtle can lay eggs as many as three times during the April to June breeding season. Kemp's ridley sea turtles prefer beach sections that are backed up by extensive swamps or large bodies of open water having seasonal narrow ocean connections and a well-defined elevated dune area. The species prefers neritic areas with sandy or muddy bottoms.

Preliminary Effects Assessment: No Effect

No suitable habitat is present in the LOD for the Kemp's ridley sea turtle because the LOD is not located in a near-shore area. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD.

Magnificent ramshorn

USFWS Recommended Survey Window: March – October (based on breeding season)

Habitat Description: Habitat for magnificent ramshorn includes still or slow-flowing freshwater bodies with spatterdock and lily pads and a pH ranging from 6.8-7.5. There are only four sites in the lower Cape Fear River Basin where the species has been historically found: Greenfield Lake, Oroton Pond (Sprunt's Pond), Sand Hill Creek Pond (Pleasant Oaks Pond), and McKinzie Pond[47].

Preliminary Effects Assessment: No Effect

During habitat assessments conducted on February 22-26 and March 1-5, 2021, no suitable habitat for magnificent ramshorn was observed. A review of NHP records, dated December 28, 2021 and October 25, 2023, indicates a known occurrence of magnificent ramshorn within 1.0 mile of the LOD. Magnificent ramshorn was last observed within 1.0 mile of the LOD in 1908[48]. Species-specific surveys of more than 100 potential sites (including most historical locations) over the last few decades have not documented any magnificent ramshorn snails, and the species is currently likely extirpated in the wild. [49]

Shortnose sturgeon

NMFS Optimal Survey Window: Surveys not required; assume presence in appropriate waters

Habitat Description: Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. The species prefers the near-shore marine, estuarine, and riverine habitat of large river systems. It is an anadromous species that migrates to faster-moving freshwater areas to spawn in the spring but spends most of its life within close proximity of the river's mouth. Large freshwater rivers that are unobstructed by dams or pollutants are imperative to successful reproduction. Distribution information by river/waterbody is lacking for the rivers of North Carolina; however, records are known from most coastal counties.

Preliminary Effects Assessment: Unresolved

Suitable habitat for the shortnose sturgeon exists in the Cape Fear River and Alligator Creek within the LOD. Coordination with NMFS will be conducted to determine how the Project may

[47] USFWS. 2018. U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form. https://ecos.fws.gov/docs/candidate/assessments/2019/r4/G02R_I01.pdf. (Accessed April 4, 2022).
[48] NHP. 2021b. North Carolina Natural Heritage Data Explorer.
[49] USFWS. 2023. Endangered and Threatened Wildlife and Plants; Endangered Species Status of Magnificent Ramshorn and Designation of Critical Habitat. https://www.federalregister.gov/documents/2023/08/18/2023-17670/endangered-and-threatened-wildlife-and-plants-endangered-species-status-for-magnificent-ramshorn-and. (Accessed October 5, 2023).

affect shortnose sturgeon. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates a known occurrence within 1.0 mile of the LOD.

Atlantic sturgeon

NMFS optimal survey window: Surveys not required; assume presence in appropriate waters

Habitat Description: The Atlantic sturgeon is a large fish that occurs in major river systems along the eastern seaboard of the United States. It is an anadromous species that migrates to moderately moving freshwater areas to spawn in the spring; in some southern rivers, a fall spawning migration may also occur. Spawning occurs in moderately flowing water in deep parts of large rivers, usually on hard surfaces (e.g., cobble). Juveniles usually reside in estuarine waters. Subadults and adults live in coastal waters and estuaries when not spawning, generally in shallow near-shore areas dominated by gravel and sand substrates.

Preliminary Effects Assessment: Unresolved

Suitable habitat for the Atlantic sturgeon exists in the Cape Fear River and Alligator Creek within the LOD. Coordination with NMFS will be conducted to determine how the Project may affect shortnose sturgeon. A review of NHP records, dated December 28, 2021, and October 25, 2023, indicates a known occurrence within 1.0 mile of the LOD.

Atlantic sturgeon Critical Habitat Designation

Specific occupied areas designated as critical habitat by the NMFS for the Carolina distinct population segment (DPS) of Atlantic sturgeon contain approximately 1,939 km (1,205 miles) of aquatic habitat in the following rivers of North Carolina and South Carolina: Roanoke, Tar-Pamlico, Neuse, Cape Fear, Northeast Cape Fear, Waccamaw, Pee Dee, Black, Santee, North Santee, South Santee, and Cooper, as well as Bull Creek[50]. Critical habitat for the Atlantic sturgeon is present in the LOD where the Preferred Alternative crosses the Cape Fear River. A Biological Assessment may be required to analyze potential impacts to the sturgeon and designated critical habitat.

4.4.2 Bald and Golden Eagle Protection Act

The bald eagle is protected under the BGEPA and enforced by the USFWS. Habitat for the bald eagle primarily consists of mature forests in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1.0 mile of open water.

[50] NOAA, National Marine Fisheries Service (NMFS). 2019. Critical Habitat Designation for Atlantic Sturgeon. https://www.fisheries.noaa.gov/action/critical-habitat-designation-atlantic-sturgeon#:~:text=Specific%20occupied%20areas%20designated%20as%20critical%20habitat%20for%20the%20Carolina,Pee%20Dee%2C%20Black%2C%20Santee%2C. (Accessed February 11, 2021).

A desktop-GIS assessment of the LOD, as well as the area within a 1.0-mile radius of the LOD boundaries, was performed on February 18, 2021 using 2019 color aerials. A review of the NHP data revealed two known occurrences of this species, both under the same record: one nest within the LOD and one within 1.0 mile of the LOD [51] [52]. Water bodies large enough or sufficiently open to be considered potential feeding sources were identified; therefore, a survey in the LOD and the area within 660 feet of the LOD boundary was conducted in accordance with *NCDOT Guidelines to Assess Potential Project Impacts to the Bald Eagle and Survey Protocols* based on the *National Bald Eagle Management Guidelines*[53]. On March 4, 2021, the bald eagle nest documented outside of the LOD was observed by WSP with an individual circling the nest. This nest is located within the 660-foot bald eagle survey area. A bald eagle nest survey was conducted in April 2021 by DCA, which confirmed the presence of the active nest observed by WSP on March 4, 2021 (**Appendix E**). No other active nests were identified during the bald eagle nest survey. Due to the presence of a bald eagle nest approximately 300 feet from the LOD, which is within the 660-foot buffer suggested by the USFWS to avoid incidental take of bald eagles, it has been determined that the Project may affect this species. Coordination with the USFWS will be conducted, and a BGEPA permit may be required for activities that result in the taking of bald eagles, as defined by the BGEPA, including disturbance of nesting bald eagles or removal of a nest. The bald eagle nesting (breeding) season in North Carolina is from December 1 through July 15.

4.4.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the take of protected migratory bird species without prior authorization by the USFWS. The USFWS lists 12 migratory birds of particular concern because they are included on the USFWS Birds of Conservation Concern (BCC) list and may occur in the location of the LOD (Table 6)[54]. Bird species listed as BCC are those that are of the highest conservation priority for USFWS.

[51] NHP. 2021b. North Carolina Natural Heritage Data Explorer.
[52] NC Natural Heritage Program (NHP). 2020. Element Occurrence shapefile for Brunswick and New Hanover Counties. (Received August 20, 2020).
[53] NCDOT. 2015. NCDOT Guidelines to Assess Potential Project Impacts to the Bald Eagle and Survey Protocols. https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20and%20Procedures/NCDOT%20Guidelines%20and%20Survey%20protocols%20for%20bald%20eagle%207-20-15.pdf. (Accessed April 4, 2022).
[54] USFWS. 2023. Information for Planning and Consultation.

Table 6: Birds of Conservation Concern for the LOD

Scientific Name	Common Name	Category of Concern[1]	Breeding Season
Falco sparverius paulus	American kestrel	BCC-BCR	April 1 – August 31
Haematopus palliatus	American oystercatcher	BCC Rangewide	April 15 – August 31
Rynchops niger	Black skimmer	BCC Rangewide	May 20 – September 15
Sitta pusilla	Brown-headed nuthatch	BCC-BCR	March 1 – July 15
Chaetura pelagica	Chimney swift	BCC Rangewide	March 1 – August 15
Rallus elegans	King rail	BCC Rangewide	May 1 – September 5
Tringa flavipes	Lesser yellowlegs	BCC Rangewide	Breeds Elsewhere
Passerina ciris	Painted bunting	BCC-BCR	April 25 – August 15
Dendroica discolor	Prairie warbler	BCC Rangewide	May 1 – July 31
Protonotaria citrea	Prothonotary warbler	BCC Rangewide	April 1 – July 31
Melanerpes erythrocephalus	Red-headed woodpecker	BCC Rangewide	May 10 – September 10
Euphagus carolinus	Rusty blackbird	BCC Rangewide	Breeds Elsewhere
Ammodramus caudacutus	Saltmarsh sparrow	BCC Rangewide	May 15 – September 5
Elanoides forficatus	Swallow-tailed kite	BCC Rangewide	March 10 – June 20

[1]"BCC — BCR" birds are Birds of Conservation Concern (BCC that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; "BCC Rangewide" birds are BCCs of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands).

4.4.4 Endangered Species Act Candidate Species

The USFWS lists the monarch butterfly (*Danaus plexippus*) is listed as a candidate species for protection under the ESA for Brunswick and New Hanover Counties. There are only a few areas in the LOD that would likely support wildflowers that are a necessary food source for the monarch butterfly. Almost all open areas within the LOD were covered in thick marsh vegetation, regularly mowed, or disturbed/developed. While there is no protection for the monarch butterfly under the ESA, the Project will continue to coordinate with the USFWS to determine if avoidance and minimization measures should be implemented to avoid potential impacts to the species.

4.4.5 Other Species of Interest

Eastern black rail

Although not currently included on the USFWS list of threatened and endangered species that may occur in the proposed project location or that may be affected by the Project, surveys for eastern black rail (*Laterallus jamaicensis ssp. Jamaicensis*) were conducted in 2021, as described below.

Habitat Description: "Eastern black rail habitat can be tidally or non-tidally influenced, and range in salinity from salt to brackish to fresh. Tidal height and volume vary greatly between the Atlantic and Gulf coasts and therefore contribute to differences in salt marsh cover plants in the bird's habitat. Further south along the Atlantic coast, eastern black rail habitat includes impounded and unimpounded salt and brackish marshes"[55].

During habitat assessments conducted on February 22-26 and March 1-5, 2021, it was determined potential suitable habitat is present for the eastern black rail in the tidal marsh areas located within the LOD where common reed was not dominant. A review of NHP records, dated December 28, 2021 and October 25, 2023, indicates no known occurrences within 1.0 mile of the LOD. Surveys were performed by Dial Cordy and Associates, Inc. (DCA) during and shortly after the peak breeding season when the bird vocalizations are highest (April 15-May 31) on the following dates: April 22 and 23; May 3, 5, 13, 14, 21; and June 2, 7, 8, and 14[56]. The protocol used for this survey focused on passive listening and broadcasting intermittent black rail vocalizations to assess black rail populations. The methods followed during this survey were adapted from the USFWS Southeast Region, 2017 *Secretive Marsh Bird Survey Protocol* which is adapted from the *Standardized North American Marsh Bird Monitoring Protocol*[57] [58]. No black rail were heard in response to the calls during the five replicate surveys at the six land- and five water-based stations. The majority of the LOD has very minimal high marsh due to anthropogenic modification of the system. Based on the lack of high marsh habitat common to this area of the river, the habitat located within the LOD would not be expected to be used commonly by black rail for nesting, as occurs in the lower, more saline, and less disturbed portions of the Cape Fear River.

4.4.6 Essential Fish Habitat

The NMFS has identified the Cape Fear River, Alligator Creek, and surrounding marshes as EFH and HAPC for fish species (Appendix A, Figure 8)[59]. HAPCs are a subset of EFHs that include areas that area rare, ecologically important to the species, stressed by development, or vulnerable to human disturbances. These areas do not carry additional restrictions or protections; however, they may warrant more stringent conservation recommendations[60]. There are HAPCs in the LOD for the snapper grouper management unit and penaeid shrimp,

[55] USFWS. n.d. *Laterallus jamaicensis jamaicensis*. https://www.fws.gov/species/eastern-black-rail-laterallus-jamaicensis-jamaicensis. (Accessed April 4, 2022).
[56] Conway, C. J. 2009. Standardized North American Marsh Bird Monitoring Protocols, version 2009-2. Wildlife Research Report #2009-02. U.S. Geological Survey, Arizona Cooperative Fish and Wildlife Research Unit, Tucson, AZ.
[57] Smith, Adam. Wiest, Whitney. 2017. 2017 Secretive Marsh Bird Survey - USFWS Southeast Region. United States Fish and Wildlife Service, Unpublished Report.
[58] Conway, C. J. 2009. Standardized North American Marsh Bird Monitoring Protocols.
[59] NOAA, NMFS. 2021b. Essential Fish Habitat – Data Inventory.
[60] NOAA, NMFS. 2020a. Habitat Areas of Particular Concern within Essential Fish Habitat. Southeast Advisory Council. https://www.fisheries.noaa.gov/southeast/habitat-conservation/habitat-areas-particular-concern-within-essential-fish-habitat. (Accessed January 7, 2022).

which are also areas designated as PNA. Table 7 lists the fish species that may occur in the LOD that are managed by NMFS, including the life stages that are reported to occur. Due to the potential impacts to EFH that my result from the Project, an EFH Assessment will be prepared to address the effects of the Project to EFH and federally managed species.

Table 7: Managed fish species reported to occur in the LOD

Species	Life Stage	Fisheries Management Council
Coastal Migratory Pelagics	All	South Atlantic
Snapper Grouper	All	South Atlantic
Atlantic Butterfish	Adult	Mid-Atlantic
Bluefish	Adult, Juvenile	Mid-Atlantic
Summer Flounder	Larvae, Juvenile, Adult	Mid-Atlantic
Spinner Shark	Neonate	Atlantic Highly Migratory Species

4.5 JURISDICTIONAL ISSUES

4.5.1 Waters of the US and Wetlands

Eleven jurisdictional streams and two additional surface waters (i.e., ditches) were identified in the LOD (Table 8). The location of these streams is shown in Appendix A, Figures 5-1 to 5-6, 9, and 9-1 to 9-6. All jurisdictional streams in the LOD have been designated as warm water streams for the purposes of stream mitigation.

Table 8: Characteristics of jurisdictional streams and surface waters in the LOD

Map ID	Length (ft.)[1]	Area (ac.)	Classification	Overall NC SAM Rating	Compensatory Mitigation Required
Cape Fear River (1)[2]	153	1.68	Perennial	High	Yes
Cape Fear River (2)[2]	150	2.96		Medium	
OWA	100	1.80	Perennial	High	Yes
SA	10	<0.01	Perennial	High	Yes
SB (2)	361	0.33	Perennial	High	Yes
SD	204	0.08	Perennial	High	Yes
ST[3]	45	<0.01	Perennial	High	Yes
SU[3]	29	<0.01	Perennial	High	Yes
SV[3]	63	<0.01	Perennial	High	Yes
SW[3]	168	0.01	Perennial	High	Yes
SX[3]	86	0.01	Perennial	High	Yes
SAA[4]	55	<0.01	Perennial	High	Yes
TA (ditch)	151	0.04	Perennial	N/A	No
TB (ditch)	30	<0.01	Perennial	N/A	No
Total[5]	1,604	6.94			

[1]Stream lengths have been rounded to the nearest whole number.
[2]Cape Fear River (1) and (2) are considered one stream, but the assessment areas were evaluated separately.
[3]Due to site inaccessibility, stream was assessed using GIS resources.
[4]Stream was not evaluated in the field and was assessed using GIS resources.
[5]The discrepancy in total length is due to rounding.

Nine jurisdictional wetlands were identified within the LOD (Table 9). The location of these wetlands is shown on Appendix A, Figures 5-1 to 5-6, 9, and 9-1 to 9-6. All wetlands in the LOD are located within the Lower Cape Fear River basin [USGS Hydrologic Unit 03030005].

Based on field observations and conversations with representatives from the USACE, DCM, and DWR, there are likely brackish and freshwater marshes present within the LOD. These marshes were presumably mostly tidal freshwater marshes in the past, but due to changes in salinity as a result of sea level rise and human influences, such as ditching land and dredging the Cape Fear River, some of the lower marshes closer to the Cape Fear River and connected waters are likely considered brackish at this time. In years with higher rainfall, the Cape Fear River discharges more freshwater and pushes the saltwater downstream; in drought years, when freshwater inflow is low, the saltwater travels further upstream. Salinity measurements were not conducted as part of this study. The NC WAM wetland type classifications and ratings are shown in Table 9 and Figures 9-1 to 9-6 in Appendix A.

Table 9: Characteristics of jurisdictional wetlands in the LOD

Map ID	NC WAM Classification	NC WAM Rating	Hydrologic Classification	Area (ac.) in Impact Area
WA	Riverine Swamp Forest	Medium	Riparian	0.49
WB	Brackish/Salt Marsh	Low	Riparian	<0.01
	Estuarine Woody Wetland	Medium	Riparian	0.13
WC	Riverine Swamp Forest	Medium	Riparian	0.06
WD	Riverine Swamp Forest	High	Riparian	1.95
	Tidal Freshwater Marsh	High	Riparian	12.92
WE	Riverine Swamp Forest	Low	Riparian	0.10
WF	Brackish/Salt Marsh[2]	High	Riparian	7.08
	Estuarine Woody Wetland[3]	High	Riparian	0.10
	Riverine Swamp Forest	High	Riparian	1.23
	Tidal Freshwater Marsh	Low	Riparian	0.16
		High		1.51
WI	Brackish/Salt Marsh	High	Riparian	1.47
	Riverine Swamp Forest	Low	Riparian	2.72
		Medium		1.26
		High		6.51
	Tidal Freshwater Marsh	Low	Riparian	1.79
		Medium		3.56
		High		3.72
WJ	Riverine Swamp Forest	High	Riparian	0.31
WK	Basin	Medium	Non-Riparian	0.02
			Total[4]	**47.10**

[1]Wetland areas have been rounded to the nearest hundredth decimal place.
[2]Due to site inaccessibility, a portion of the wetland was assessed based on field observations of the brackish marsh in WF and GIS resources.
[3]Due to site inaccessibility, wetland was assessed at a distance using binoculars and GIS resources.
[4]Total area was calculated by GIS using unrounded wetland acreages. The discrepancy in total area is due to rounding.

4.5.2 Clean Water Act Permits

Based on the number and size of jurisdictional wetlands and streams in the LOD, a Clean Water Section 404 Individual Permit will likely be required; however, the USACE holds the final discretion as to what type of Section 404 permit will be necessary to authorize Project impacts. A Clean Water Act Section 401 Water Quality Certification (WQC) from the DWR will also be required.

The Cape Fear River crossings are designated as USACE civil works projects. In addition, a civil works project is located in the vicinity of wetland WD. As such, a Clean Water Act Section 408 approval from the USACE will be required for the alteration, occupation or use of the civil works projects.

4.5.3 Coastal Area Management Act Areas of Environmental Concern

There are CAMA AECs present in the LOD, including public trust areas, estuarine waters, coastal shorelines, and coastal wetlands (Appendix A, Figure 10). On December 9, 2021, WSP met with the DCM to review potential coastal wetland locations within the LOD. At this time, the DCM has not made an official determination of the coastal wetland boundaries within the LOD but has agreed with the approximate locations shown in Appendix A, Figure 10, and discussed in Appendix F. The normal high water line was not delineated within the LOD. Given the size of the LOD and amount of tidal marshes, the DCM suggested a mean high water line be used in place of a normal high water line to determine the boundaries of the public trust areas and coastal shorelines AECs. A topographic survey will be needed for the LOD and analyzed with tidal data to determine the mean high water line. The public trust areas and coastal shorelines presented in this report are from GIS data created by NCDOT and provide a general location of where AECs likely exist within the LOD (Appendix A, Figure 10)[61]. A CAMA major permit from the DCM will be required for impacts to designated AECs within the LOD.

4.5.4 Federal Emergency Management Act Floodplains

Much of the LOD occurs in floodplains recognized on the FEMA Flood Insurance Rate Maps (FIRMs) as Special Flood Hazard Area (SFHA), also known as areas within the 100-year floodplain[62]. Coordination with FEMA will be required to ensure there will be no negative impacts to the base flood elevation (BFE) and insurable structures resulting from the Project.

4.5.5 Resources with Construction Moratoria

The North Carolina Division of Marine Fisheries (DMF) has identified the Cape Fear River in the LOD as PNA and coastal and joint AFSA. The river has also been identified as sturgeon spawning waters and designated critical habitat for Atlantic sturgeon by the NMFS. In-water work in these areas may be subject to the standard and anadromous fish moratoria in effect from February 1 through September 30[63]. These dates are approximate and dependent on site-specific environmental conditions. In response to the Start of Study Letter for the Project, the USFWS recommended no in-water work during anadromous fish spawning season from February 15 to June 30. Additional in-water work restrictions may also be applicable for this Project and will be addressed prior to permitting.

4.5.6 NC River Basin Buffer Rules

There are no state riparian buffer rules in effect for the waters in the Cape Fear River Basin, where the LOD is located.

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[61] NCDOT. 2022. ATLAS Screening Tool.

[62] NC Floodplain Mapping Program. 2018. North Carolina Flood Risk Information System, Panels 3117 and 3118. https://fris.nc.gov/fris/Home.aspx?ST=NC. (Accessed January 3, 2022).

[63] NOAA, National Centers for Coastal Ocean Science, National Ocean Service. 2019. An Assessment of Fisheries Species to Inform Time-of-Year Restrictions for North Carolina and South Carolina. NOAA Technical Memorandum NOS NCCOS263 2019. https://repository.library.noaa.gov/view/noaa/22032. (Accessed January 4, 2022).

4.5.7 Rivers and Harbors Act Section 10 Navigable Waters

The Cape Fear River has been designated by the USACE as a Navigable Water of the U.S. under Section 10 of the Rivers and Harbors Act. The construction of any structure in or over any navigable water of the U.S., the excavating from or depositing of material in such waters, or other work affecting the course, location, condition, or capacity of such waters requires a Section 10 Permit from the USACE. The Section 10 permit is processed concurrently with the Clean Water Act Section 404 permit through the same application to the USACE.

4.5.8 Coastal Barrier Resources System

No Coastal Barrier Resources System (CBRS) units exist within the LOD [64].

4.5.9 Wetland and Stream Mitigation

4.5.9.1 AVOIDANCE AND MINIMIZATION OF IMPACTS

The Project will attempt to avoid and minimize impacts to wetlands, streams, and other environmentally sensitive areas to the greatest extent practicable during project design and construction.

To minimize wetland impacts, a single-track bridge is proposed over the wetlands between the two Cape Fear River crossings, as well as a section just north of the northern Cape Fear River crossing. The CSX standard for the width of a single-track bridge is approximately 16.5 feet. Wetlands between the two Cape Fear River crossings areas are primarily high-quality, and the minimum vertical clearance (MVC) in this area ranges from approximately 9.5 to 28.5 feet. Considering a bridge width of 16.5 feet, vertical clearances of more than approximately 11.5 feet will generally minimize shading effects to the wetlands. The MVC over the wetlands north of the northern Cape Fear River crossing ranges from 8.4 to 9.4 feet.

The proposed alignment north of the proposed bridge (north of the Cape Fear River) uses uplands, existing built-upon areas, and a remnant railroad bed where feasible to reduce the amount of fill impacts to wetlands and coastal wetlands. Fill in wetlands is being proposed in this area to avoid conflicts with the existing Duke Energy powerlines and towers that would occur if the track was built on structure. This area is comprised of more low- and medium-quality wetlands (due to human disturbance) than the area between the Cape Fear River crossings where the railroad will be on structure. The embankment where the fill is being proposed will include culverts designed to handle 100-year flood flow and allow for aquatic organism passage.

Temporary access roads would utilize existing gravel roads, where possible. A temporary causeway or temporary bridge could be used in areas where temporary access requires heavy equipment to cross wetlands to avoid permanent impacts. A floating barge could be used for construction access in areas of open water to avoid impacts to the channel bed. The

[64] USFWS. 2019. Coastal Barrier Resources System: Official CBRS Maps. https://www.fws.gov/cbra/maps/index.html. (Accessed February 10, 2021).

constructed areas (bridges and embankments) for the Project may also serve as staging and storage areas in remote areas to reduce environmental disturbances during construction.

The Design Standards for Sensitive Watersheds (15A NCAC 04B .0124) should be considered for erosion and sedimentation control measures, structures, and devices in areas designated as PNA[65].

Through ongoing agency coordination, the proposed design, construction schedule, and methods will be refined to incorporate avoidance and minimization measures to reduce impacts to natural resources.

4.5.9.2 COMPENSATORY MITIGATION OF IMPACTS

The potential for on-site stream and wetland mitigation opportunities will be investigated. If on-site mitigation is not feasible, mitigation requirements will be satisfied through the purchase of mitigation credits from an approved mitigation bank and/or the North Carolina Department of Environmental Quality Division of Mitigation Services (DMS) in-lieu fee program. In areas that will be bridged, there will be permanent direct impacts due to fill where bents, columns, and footings are placed. Mitigation is anticipated for permanent impacts to wetlands, coastal wetlands, and streams. At the time of this report, the DMS in-lieu fee program rate is $67,442.06 per mitigation credit for freshwater wetlands, $560,000.00 per mitigation credit for coastal wetlands, and $603.87 per mitigation credit for streams (effective through June 30, 2022)[66].

Bridges over tidal marshes may result in a loss of vegetation due to shading and negatively affect the productivity of the underlying marsh; however, it has been shown that bridges with height/width (HW) ratios greater than 0.7 "do not adversely impact the productivity or function of the underlying marsh"[67]. Assuming a 16.5-wide single-track bridge, the HW ratio for the proposed bridge over the majority of the wetlands between the two Cape Fear River Crossings is greater than 1.0; therefore, mitigation for shading impacts is not anticipated for the majority of this area. The HW ratio over coastal wetlands decreases to approximately 0.5 on the south side of the northern crossing of the Cape Fear River. The HW ratio over coastal wetlands is also approximately 0.5 north of the northern crossing of the Cape Fear River. Mitigation may be

[65] Design Standards for Sensitive Watersheds, 15NCAC 04B 0.124. (1990 and 2020), http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2004%20-%20sedimentation%20control/subchapter%20b/15a%20ncac%2004b%20.0124.pdf. (Accessed January 27, 2022).

[66] NCDEQ, DMS.2021. Current Rate Schedules. https://deq.nc.gov/about/divisions/mitigation-services/dms-customers/current-rate-schedules (Accessed January 7, 2022).

[67] Broome, S. W., C. B. Craft, S. D. Struck, and M. San Clements. 2005. Effects of Shading from Bridges on Estuarine Wetlands. https://connect.ncdot.gov/projects/research/RNAProjDocs/2001-12FinalReport.pdf (Accessed January 7, 2022).

required for shading impacts to the coastal wetlands; however, it should be noted that much of the area north of the northern crossing of the Cape Fear River is dominated by common reed.

The Preferred Alternative crosses over the Alligator Creek Restoration and Conservation project footprint. The Alligator Creek Restoration and Conservation project is a selected mitigation alternative, along with nine other habitat restoration projects, proposed to offset impacts to natural resources from the Kerr-McGee Chemical Corporation Site in Navassa, as noted in the *Final Phase 1 Restoration Plan and Environmental Assessment*[68]. The railroad realignment is proposed to be on structure (bridged) in this location. According to the Alligator Creek Restoration detail plan presented in the *Final Phase 1 Restoration Plan and Environmental Assessment*, the proposed bridge would avoid the open water tidal enhancement, wetland restoration, and Alligator Creek stream restoration but would cross the *Phragmites* treatment area, coastal resiliency berm, walking trail, and observation platform. Coordination will continue with the entities involved with the Alligator Creek Restoration and Conservation project during the planning and design phase of this Project to avoid and minimize impacts. Coordination with the Interagency Review Team (IRT) and purchase of additional mitigation credits may be required for unavoidable impacts.

[68] NOAA. 2020. Final Restoration Plan and Environmental Assessment for the Kerr-McGee Chemical Corp. Site, Navassa, North Carolina, Phase 1. https://pub-data.diver.orr.noaa.gov/admin-record/6102/Kerr-McGee_Final_RP-EA_04-02-20.pdf. (Accessed January 7, 2022).

5. IMPACTS ASSESSMENT

Impacts to natural resources can be classified into two separate categories: sections proposed to be built on bridge structure and sections proposed to be built on fill. The results from an impact assessment for potential impacts to natural resources are shown in Table 10.

5.1 BRIDGE SECTION

For purposes of this document, permanent impact to wetlands, streams, and the Cape Fear River from bridging assumes an approximately 50-foot wide (25 feet on each side of the centerline) permanent impact footprint for the length of the proposed bridge. The impacts reflected in Table 10 assume the entire area within the 50-foot-wide permanent impact footprint will constitute a permanent direct impact. The location, configuration, and size of the bridge substructure (e.g., bents, columns, footings, etc.) will be determined in the future during a later phase of the design development when structural design begins, which will allow for a refinement of Project impacts.

The MVC of the bridge over wetlands ranges from approximately 8.4 to 28.5 feet. The MVC over the wetlands between the two Cape Fear River crossings ranges from 9.5 to 28.5 feet. The MVC over the wetlands north of the northern Cape Fear River crossing is 8.4 to 9.4 feet. The bridges over the Cape Fear River are proposed to be movable span bridges. The MVC of the proposed moveable span over the smaller, northern Cape Fear River crossing is approximately 9 feet in the closed position. The MVC of the proposed moveable span over the larger section of the Cape Fear River near the Wilmington Harbor is approximately 20 feet in the closed position. The moveable span clearances over the Cape Fear River are under review by the United States Coast Guard and are subject to change.

Temporary impacts in the sections to be built on bridge over wetlands are generally 50 feet wide on each side of the permanent LOD. The temporary impacts assume conventional bridge construction methods would be utilized in wetlands with a parallel construction access road on each side of the bridge. Two additional temporary construction roads in this section have been assumed in order to access the proposed bridge from US 421. Temporary LODs at the two Cape Fear River crossings are generally 50 feet wide on each side of the bridge and are included to account for potential construction access and construction methods. Construction access and construction methodology in wetlands and in the river will be considered during structure design.

5.2 FILL SECTIONS

Permanent wetland impacts in sections proposed on fill are based on preliminary design slope stakes plus an additional 25 feet to account for potential utility and drainage requirements. In the section proposed on fill in the mostly undeveloped northern section of the alignment between the existing CSXT rail and the proposed rail bridge structure, fill slopes vary in width from approximately 140 feet to approximately 210 feet. In the section proposed on fill to the

east of the Cape Fear River, which is in a highly developed area near the Port of Wilmington, permanent fill slope widths vary from approximately 79 feet to approximately 140 feet.

Temporary impacts to wetlands and waters in areas to be built on fill were established considering such factors as potential utility relocations, construction access, and material storage. These temporary LODs vary in size and shape and include access from US 421 in the northern section of the alignment.

Table 10: Summary of potential permanent, temporary, and total impacts for the Preferred Alternative [1]

Metric Category	Impacts		
	Permanent	Temporary	Total[6]
Total acreage of wetlands	26.45	20.65	47.10
Total acreage of high-quality wetlands[2]	17.39	19.41	36.80
Total acreage of medium-quality wetlands[2]	4.46	1.06	5.52
Total acreage of low-quality wetlands[2]	4.60	0.17	4.77
Total acreage of coastal wetland AECs[3]	10.80	10.88	21.67
Total linear feet of streams	560	863	1,423
Total linear feet of high-quality streams[4]	510	763	1,273
Total linear feet of medium-quality streams[4]	50	100	151
Total acreage of streams	2.36	4.54	6.89
Total acreage of high-quality streams[4]	1.37	2.56	3.93
Total acreage of medium-quality streams[4]	0.99	1.98	2.96
Total linear feet of surface waters (ditches)	15	166	181
Total acreage of surface waters (ditches)	<0.01	0.04	0.04
Total acreage of FEMA SFHA floodplains[5]	36.86	31.19	68.05
Presence of T&E species habitat	Yes	Yes	Yes
Total acreage of PNA[5]	1.74	2.79	4.54
Presence of EFH	Yes	Yes	Yes
Total acreage of NHP Natural Areas[5]	25.03	26.57	51.60
Total acreage of NHP Natural Area-Brunswick River/Cape Fear River Marshes[5]	24.02	24.60	48.62
Total acreage of NHP Natural Area-CPF/Lower Cape Fear River Aquatic Habitat[5]	1.01	1.97	2.98

[1] Areas have been rounded to the nearest hundredths place. Lengths have been rounded to the nearest whole number.
[2]Quality of wetlands was based on results from the NC WAM functional assessment ratings. Wetland functional ratings have not been verified by USACE.
[3]Coastal wetland AEC boundaries were reviewed in the field by DCM but an official determination has not been made at the time of this report.
[4] Quality of streams was based on results from the NC SAM functional assessment ratings. Stream functional ratings have not been verified by USACE.
[5]Impacts calculated using GIS resources.
[6]The discrepancy in totals is due to rounding. Totals were calculated using GIS.

6. CONCLUSIONS

The No-Build Alternative would result in no impacts to natural resources except for improvements planned as part of the Wilmington Beltline Improvement Project (NCDOT STIP P-5740) and two additional grade-separated crossings that are planned as part of the Independence Boulevard Project (NCDOT STIP U-4434).

The Preferred Alternative would result in impacts to wetlands, streams, and AECs. An Individual Section 404/Section 10 permit from the USACE, Section 401 WQC from the DWR, and CAMA major permit from the DCM will likely be required for the Project. In addition, a Section 408 approval from the USACE will likely be required for impacts to the USACE civil works projects at the proposed Cape Fear River crossings. Mitigation will be required for any impacts that result in the loss of wetlands, including coastal wetlands, and streams.

A coastal zone consistency determination will be prepared in accordance with the Coastal Zone Management Act (CZMA) to evaluate the Project's proposed activities for consistency with, to the maximum extent practicable, the state's coastal management program. Adverse impacts to coastal resources and coastal uses must be avoided to the greatest extent possible and impacts that cannot be avoided must be minimized and mitigated. The NEPA and consistency determination review processes are separate procedures requiring different courses of review and action but are sometimes included together to streamline the environmental review process[69].

With the exception of most inland areas east of the Cape Fear River and the US 17/US 421 interchange, the entire length of the Preferred Alternative is located in FEMA-regulated floodplains. Coordination with FEMA will be required to ensure there will be no negative impacts to the BFE and insurable structures resulting from the Project.

Section 7 consultation with the USFWS and NMFS will be conducted to determine how the Project may affect the protected species listed for Brunswick and New Hanover Counties and what measures should be taken to avoid and minimize impacts.

[69] NCDEQ, DCM. 2013. North Carolina Federal Consistency Determination Submission Guidance (Subpart "C" 15 CFR 930). https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Guidance%20subpart%20C%20fact%20sheet.pdf. (Accessed on January 10, 2022).

During Project construction, the Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters will need to be followed in locations of suitable habitat for manatees, which includes the Cape Fear River and streams with water depths greater than or equal to 5 feet[70]. The USFWS also encourages projects to follow certain conservation measures to avoid and minimize potential mortality of NLEB during construction activities, such as removing trees outside the pup season (June 1 to July 31) and/or active season (April 1 to October 31). Including the voluntary time restrictions for cutting trees may affect the Project schedule[71].

A Biological Assessment may be required during the Section 7 consultation with NMFS to assess impacts that may result from the Project to the shortnose and Atlantic sturgeon, and the Atlantic sturgeon designated critical habitat.

An EFH Assessment will be prepared for the NMFS to assess impacts to EFH and HAPC that may result from the Project.

There will be a construction moratorium for work in waters designated as PNA, AFSA, and sturgeon spawning waters. The USFWS recommended an in-water work construction moratorium during the anadromous fish spawning season from February 15 through June 30 for this Project. Additional in-water work restrictions may also be applicable for the Project and will be coordinated with the agencies prior to permitting.

A BGEPA permit will likely be required by the USFWS because the Project is located within 660 feet of an active bald eagle nest.

Agency coordination with the NMFS, DMF, North Carolina Wildlife Resources Commission, DCM, DWR, and USACE will continue as the Project moves forward to ensure agency requirements and concerns are being addressed.

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Appendix A.
Figures

Figure 1. Site Location Map

Figure 2. No-Build and Preferred Alternative Corridors

Figure 3. USGS Topographic Map

Figure 4. Soil Survey Map

Figures 5-1 to 5-6. Approximate Waters of the U.S. Map

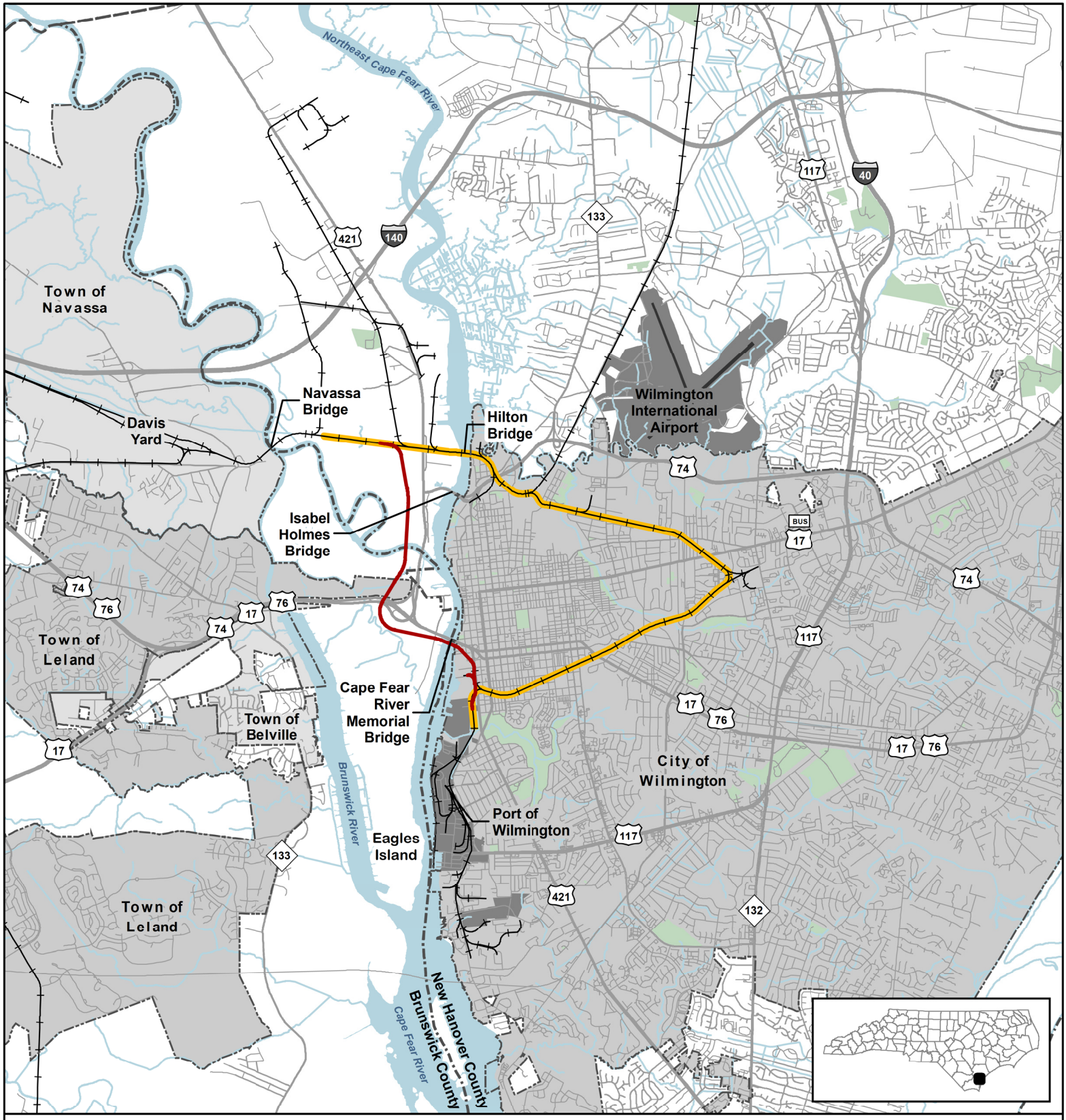
Figure 6. Primary Nursery Areas Map

Figures 7-1 to 7-6. Terrestrial Communities

Figure 8. Essential Fish Habitat

Figures 9, 9-1 to 9-6. North Carolina Stream and Wetland Assessment Ratings Map

Figure 10. Potential Areas of Environmental Concern



CITY OF WILMINGTON NORTH CAROLINA

Wilmington Rail Realignment Project

New Hanover County and Brunswick County, NC

Legend

- County Boundary
- Municipal Boundary
- Park
- No-Build Corridor
- Preferred Alternative
- Railroad

Figure 1
Site Location Map

Date: January 2022

0 0.5 1 2
Miles

1 inch = 8,000 feet

CITY OF WILMINGTON NORTH CAROLINA

Wilmington Rail Realignment Project

New Hanover County and Brunswick County, NC

Source: Esri Aerial Imagery

Legend

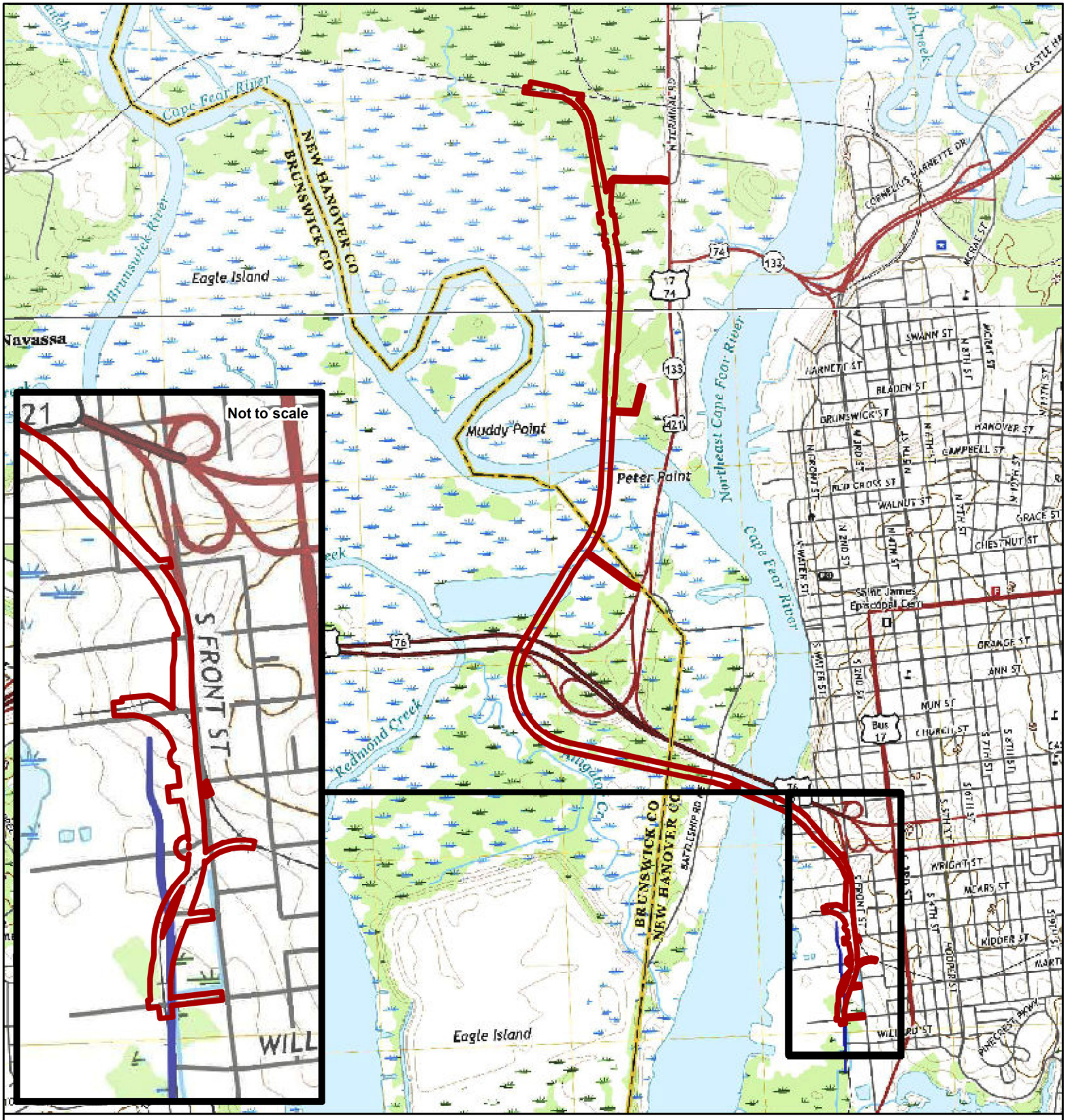
- Preferred Alternative Impact Area
- No-Build Corridor
- Railroad

Figure 2
No-Build and Preferred Alternative Corridors

Date: January 2022

0 0.25 0.5 1
Miles

1 inch = 4,000 feet



CITY OF WILMINGTON
NORTH CAROLINA

Wilmington Rail Realignment Project

New Hanover County and Brunswick County, NC

Legend

Preferred Alternative Impact Area

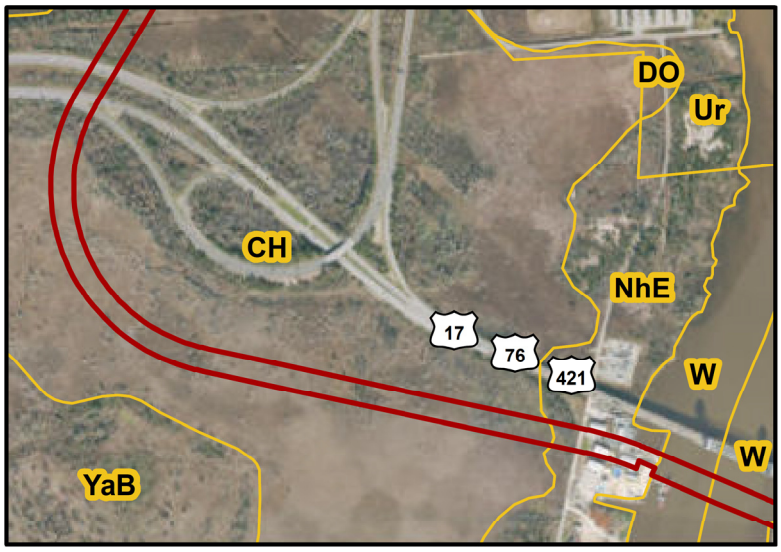
Figure 3
USGS Topographic Map

Date: January 2022

0 0.125 0.25 0.5
Miles

1 inch = 2,250 feet

Source: Wilmington & Castle Hayne, NC 7.5 Minute Quadrangles (USGS, 2019)



Map Unit Symbol and Name	Hydric
Bh - Baymeade-Urban land complex, 1-6% slopes	Yes
CH - Chowan silt loam	Yes
DO - Dorovan soils	Yes
NhE - Newhan fine sand, dredged, 2-30% slopes	No
Ur - Urban land	No
W - Water	-

CITY OF WILMINGTON NORTH CAROLINA

Wilmington Rail Realignment Project

New Hanover County and Brunswick County, NC

Legend

- Preferred Alternative Impact Area
- Soils
- Railroad

Figure 4
Soil Survey Map

Date: January 2022

0 0.1 0.2 0.4
Miles

1 inch = 1,250 feet

Source: Esri Aerial Imagery and NRCS Web Soil Survey spatial data dated Sep 16, 2019